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ABSTRACT

This guide contains learning activities in environmental education developed by teachers and intended for use at the elementary or junior high school levels. Topics covered include: water, esthetics, air, soil and sediment, solid waste, energy, noise, population, and transportation. Generally, each activity contains an introduction, a listing of materials, the statement of procedure, and several appropriate questions to ask the students. Activities are interdisciplinary and include pond studies, poetry writing, and art work. The appendix contains information about the development and writing of this curriculum guide. (MA)

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A CURRICULUM ACTIVITIES GUIDE

Project KARE

A National Model for Strengthening Environmental Studies in Local Schools

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to Selected Environmental Topics for use with Elementary and Junior High School Students

SE 022 842

A CURRICULUM ACTIVITIES GUIDE TO SELECTED ENVIRONMENTAL TOPICS FOR USE WITH ELEMENTARY AND JUNIOR HIGH SCHOOL STUDENTS

Edited by
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PREFACE

The activities in this book were produced by the participants in the course, "Environmental Studies in Elementary Schools". Sponsored by the Montgomery County Intermediate Unit In-Service Council and taught by Project KARE staff, this course was headquartered in the Paul V. Fly Elementary School of the Norristown Area School District. Originally planned for elementary teachers only, the content was modified to include appropriate information and experiences for junior high school teachers as well.

Beginning with the second day of the course and continuing through the last, one of the requirements was for each participant to develop and submit for comment an activity dealing with the topic(s) of the previous day. These activities, with minor editing, make up this book.

Considering the facts that most of them were writing activities for topics which they had just initially experienced; that they had no previous experience with this activity format; and that the activities presented here were their initial drafts, one inevitably concludes that the participants achieved significantly in a short time (10 days).

The appendix contains a "Fact Sheet" about Project KARE, a brief description of the course topics and content, instructions (which were given to the participants) for writing the activities and some examples of Haiku and other poetry produced by the participants and the instructors.

ACKNOWLEDGEMENTS

We are grateful to Dr. Dennis Harken, Executive Director, Montgomery County Intermediate Unit #23, for making the expertise of Intermediate Unit staff available to us during the planning, conducting and follow-up phases of this course. Mr. Louis A. Krug and Dr. Donald Wright very ably represented the Intermediate Unit and worked in liaison with the Montgomery County Intermediate Unit In-Service Council for approval of the course.

Special thanks go to Dr. Jay L. Gruener, Superintendent of Schools, Norristown Area School District, for extending the opportunity to utilize the Paul V. Fly School as the site for the course. Mrs. Mary Stemple, Principal, and the service personnel of this school were most cooperative and made our stay in their building very pleasant.

The typing skills of Mrs. Bette Pasquarello, Miss Janet Hyland and Mrs. Patricia Rotelli greatly aided the editor in the preparation of this book.

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NOTE: The comments of the instructors appear in upper case.

WATER.....

Water Studies Activity Summary....

A Diversity Index Study of the Macro-invertebrates
Found in the Perkiomen Creek Near East Greenville

Introduction:

The Perkiomen Creek is located about 3/4 mile from the Upper Perkiomen Middle School. The watershed draining into this area is quickly being developed with townhouses and factories. Pillsbury, Knoll's Furniture, and Conte Tomato deposit wastes into the Perkiomen Creek near our school. As a year-long activity, we could set up possible testing areas (one for each section of students) and complete a riffle analysis for each site. The sights might be located below the two sewage pipes and one below Conte Tomato and then be compared to cleaner sections of the stream. Data might be collected four times at two month intervals during the school year and be kept as a record from year to year. Mr. Smith, Manager of the East Greenville water treatment plant, stated to our students that the quality of the water has gone down over the last three years. This study might help to show what effect this is having on the organisms in the creek.

Awareness level:

a. Students could hike the length of the stream to be studied and then choose a testing site.
b. Prepare an eyeball study of the site with reference to odor, color, flow, plant growth, sedimentation, litter, visible animal life, and any other criteria that might have something to do with the study.
c. Decide on equipment and collection procedure, build equipment, and collect the macro-invertebrates.
d. Actually make a diversity index in the laboratory.

Transitional level:

a. Predict possible differences due to sewage wastes and factory wastes.
b. Evaluate the collection technique and see if it can be improved.

Operational level:

a. Students may want to develop their own testing technique and plan studies of their own. Some areas might include:

    1. Microscope studies where zooplankton and phytoplankton could be identified and maybe a diversity index prepared of these.
    2. Tests using organisms in cages might be developed to study changing conditions over a 96 hour period.
    3. Volume of water or a creek flow study might be worked out with the aid of the math teacher and these checks be made during various changes in the creek.
    4. A collection of different species of fish found in the stream could be made. We have several large seining nets, but need a permit to use them for study purposes.

Additional activities that would correlate to a stream study project:

a. Participation by our students in the program "Let's Adopt A Stream" sponsored by the Fish Commission. This stream deals with such topics as building trash containers for along the stream, picking up litter, building walls to prevent bank erosion, etc.
b. Keeping a fresh-water aquarium in the classroom that contains organisms found in the creek.
c. Starting a study collection of preserved specimens.
d. All of this forms a vehicle for a detailed study of the plant and animal kingdoms which is part of the curriculum in the 7th grade.

THIS IS A PLAN FOR A WATERSHED STUDY, AND AS SUCH DOES NOT QUALIFY AS AN ACTIVITY. THE OVER-ALL SCIENCE PART OF THE PLAN IS GOOD, BUT IT NEEDS COMMUNITY INPUT AND A SOCIAL ACTION PHASE.

"The World of Microorganisms"

Introduction

The purpose of this activity is to enable the student to become aware of the variety of microorganisms that exist in pond water, and in turn, recognizing the dependency of one organism upon another for survival. This activity is designed for grades 4-6. The time required for my particular ability groups would be approximately two weeks.

Equipment

1. Microscope
2. Hand lens
3. Microprojector
4. Test cups
5. Thermometer
6. Eyedropper
7. Data chart for specimens

Procedure and questions

Step 1. What is a pond?
Is a pond non-moving water?
Does a pond contain life?
Is there life around a pond?

Discuss pond life, vegetation and sources of water. Pond life may include frogs, hydra, water skippers, aquatic snails, crayfish, toads, spiders, flies, grasshoppers, turtles, snakes, salamanders and snails. Vegetation: mosses, algae cattails, water lilies, algae, reeds and grasses.

Step 2. Take a planned field trip to a pond. Have students take temperature readings and water samples at different depths and record the data. Look for all of the different forms of life and vegetation. Gather a few specimens of the following: water samples, algae, mosses, insects, animals and life from covered rocks. Have the student record any unusual examples of coloration.

Step 3. What is the source of water in the pond?
What kinds of animals and insect life are there?
What kinds of plants were found?
Could there be life in the water that we could not see?
How could we examine the life?

Put a drop of water you collected from the pond on a slide and cover it with a coverslip. Place the slide on a microscope or microprojector.

What do you see under the microscope?
Can there be life we can't see?
What would happen if the pond dried up?
Is there any form of life on the rocks?
How could you examine it more closely?
What is the temperature of the water?

Does the temperature vary with depth?
Is the water temperature important to the life in the pond?
Why are algae and other plant life important?

Explanation: Temperature is important to life. If the pond is deep, there will be different types of life living at different depths. Algae and other plants serve as food for fish and some water insects.

Step 4. Did you see any examples of how life was colored so you could not see it easily?

Set up microscopes for the students to observe the material of the wood, lichens on the rock, and the pond water more closely. Pour a glass of pond water and a glass of tap water. After looking at the pond water under a microscope, why do you think you shouldn't drink pond water? Why is it safe to drink tap water?

Explanation: City water has been purified by killing all these organisms.

Summarize the lesson by reviewing what the purpose of each organism is in the pond, pointing out how the organisms are dependent on each other. In the upper grades the setting up of a food chain would provide an excellent culminating activity.

SCOPE IS A BIT BROAD FOR A SINGLE ACTIVITY.
EVALUATION?

Introduction:

This activity is designed to allow the students to become aware of the amount (and diversity, depending on lateness of year) of animal life at two locations on Lake Lenape Creek. One location being found where a plastics company dumps their waste water, and the second further up-stream. The time required depends upon the extensiveness of the project.

Equipment needed:

1. Screening
2. Jars for water samples
3. Students

Procedure:

1. Have students go to two locations on Lake Lenape Creek in Perkasie. They will test one location where a plastics company dumps their waste water into the creek. They will then travel up-stream to a different location where the creek is not affected by this waste water.
2. While at the creek, they will first "eye-ball" the environment of the creek, checking for smell and the appearance of both locations.

Questions:

a. What does the foliage and plant life look like at both locations? (in and around the location)?
b. What does the bottom of the creek look like?
c. What is the appearance of the top of the water?
d. Can you detect any odor at either location?

3. Using the school polaroid camera, some students could even take pictures of each location - for further reference back in the classroom.
4. The students will find rift areas at each location to collect organism specimens.
5. These specimens will be placed in separate collection bottles and carried back to the classroom.
6. While in the classroom, the number of individual specimens will be tallied.
7. The students will then compare the two locations through using the comparing of the tallied numbers at each location.
8. The students should then be able to discern if the plastics company's waste water is affecting the environmental balance of the stream at this point.
9. Run a Diversity Index Test to further substantiate findings.

(Samples collected in jars can now be used to do a microscopic study on the same two areas. This also will help to further substantiate findings - this used by more capable students as an independent study).

EVALUATION?
BE SPECIFIC RELATING TO ACTIVITIES WHICH LED TO, WHICH INITIATE, ETC.

Comparing Water Samples

Prepared for grade 1 at awareness level.
Materials: bottle of faucet water & bottle of creek water.

1. Lead-Up Activities

   a. What is water used for?
   b. Where does water come from?

2. Initiation Activities

   a. What do you think is in these two bottles?
   b. Do they look the same?
   c. Do they smell the same?

3. Continuation Activities

   a. Does the water in both bottles look the same?
   b. Does one look clearer than the other?
   c. Can you see anything in either bottle? If so, describe what you see.
   d. What color is what you see?
   e. Does what you see move or stand still?
   f. What do you think they might be?
   g. Smell the two bottles. Is there any difference? Does one smell better than the other?

4. Expansion Activities

   a. Where do you think the water in the bottles came from?
   b. Do you think this water (creek sample) came out of your faucet? Why?
   c. Do you think this water (faucet sample) came out of our creek? Why or why not?
   d. Do we need water to live?

5. Evaluation Activities

   a. Which water would you rather take a bath in? Why?
   b. Which water would you rather drink? Why?
   c. Which water would the tiny animals that you saw rather live in? Why?
   d. If you could own all the water on the earth, what would you do with it?

POSSIBLE ADDITION:
CLOSE BOTH BOTTLES AND LEAVE ON WINDOW SILL FOR SEVERAL MONTHS. MAKE PERIODIC OBSERVATIONS.

Water Study Activity
Do Industries in Phoenixville Pollute French Creek?

I. Introduction: This activity is to introduce the students to a practical application of the comparisons of diversity indexes from samples collected in the same stream before and after the introduction of polluting effluents. Five junior high school classes will conduct this study. Time requirement is approximately one week.

II. Questions:

1. Are industries polluting this creek?
2. What evidence do you have?
3. Is it enough evidence on which to base any action?
4. What indications would the creek give you?

HOW? 5. Can they be measured?

III. Instruction and Class Discussion:

Of the values, procedures, limitations, interpretation of the diversity samples and the diversity index.

IV. Preparation:

1. Collect and construct needed equipment.
   a. Coffee cans, screen for nets, wood for net handles, staples and stapler, pans or trays for sorting, baby food jars for sorting.
2. Determine study sites. Select five above and five below possible introduction of effluent. "One each for each class - not same place". Should be in riffed areas.

V. Procedures:

Samples should be collected along transect across the collecting site with one taken at each side and one in the middle. Class will be divided into six groups -each group will separate ½ of a sample. Each class will calculate their diversity indexes and compare their results with other classes.

VI. Follow-Up:

If significant differences appear between the pre and post samples, further investigation would be made by subdividing the creek between the sites to pinpoint area of pollution. If serious problem is evident, we would contact Project KARE for further instructions for possible action to be taken.

EVALUATION?

WATER

I. Introduction

A. The purpose of this exercise is twofold - (1) to introduce the children to the microscope and its uses, (2) to make the students aware of living creatures which are undetectable with the unaided eye.

II. Questions

1. To lead to the activity

HOW WILL STUDENTS BE ABLE TO ANSWER THIS?---a. Where did life begin on this planet - on the land or in the sea?
b. Were the first creatures to live on earth very, very large or very, very small?

2. To initiate the activity

a. Give a demonstration on the use of a microscope for those students who are not familiar with using a microscope.
b. Hold up a container of pond water. Do you think that you can find a living creature in this water?

3. To continue the activity

a. How many different creatures can you find in your pond water?
b. What makes these creatures different?
c. In what ways are they the same?

4. To expand the activity

a. I will instruct the class in doing (computing) the diversity index for the protozoans found in the pond water.
b. We will have a short discussion on stability.
c. Do you think that the water in this pond was taken from a stable environment?

5. To evaluate

a. What did you learn from this activity?
b. What would you change if this activity would be done again?

6. Equipment

1. pond water
2. 15 microscopes
3. cover slips
4. Slides
5. about 30 students
6. 1 teacher

WATER STUDIES

1. Can you name some of the macro-organisms that live in the creek near your home? NOT IMPORTANT FOR A BEGINNING.

2. How could we find out? Which would be the best method?

Have the students collect specimens from the stream. In the classroom, they can compare and categorize the macro-organisms, sorting into separate containers by type. Collect the data.

What generalizations can we make? What does this data tell us? What else supports this hypothesis? What else can we do to test this hypothesis?

To collect specimens: small nets, scoops, a piece of fine screening, forceps, small jars, extra containers to sort (egg cartons).

THIS DOES NOT FOLLOW THE REQUIRED FORMAT

WATER STUDY

Comparing Stream Velocity with Stream Bed

I. Introduction

The activity is for children to observe the type of bottom a stream has at places where the velocity is different.

II. Questions

1. To lead to the activity

What is the difference between a stream and a pond? Are all streams alike? Is a stream the same its whole length? Have you every gone barefoot in a stream? What is it like?

2. To initiate the activity

How could we find how fast a stream flows at certain spots? How could we find what the bottom of the stream is like at certain spots?

3. To continue the activity

What was the speed at the fast part of the stream? At the slow part? What were the bottoms of the slow moving part and the fast moving part of the stream like?

4. To expand the activity

Do you think other streams are like this at their slow and fast moving parts? Would the organisms living in the slow part of the stream be the same as those living in the fast part?

5. To evaluate the activity?

Did the slow moving part of the stream have the same bottom as the fast moving part? Why were they like that?

III. Equipment

1) Floats (pieces of wood, plastic foam)
2) Stop watch (or watch with second hand)
3) Previously measured string (25 ft. or more)
4) 2 buckets

IV. Procedure (some procedure is done at the 2 points)

1. Divide into three groups a) timers and recorders b) upstream marker and float tossers c) distance measurers and downstream marker.
2. Mark the distance to be measured (straight section of about 25 ft.)
3. Toss in the float and record the time of the passage of the float from the upstream market to the downstream marker.
4. Calculate the velocity of the two sections of stream in feet per second (or feet per minute, meters per minute, miles per hour.)

5. Study the samples from the bottom of the stream (2 sections). Observe any differences.
6. Compare the velocity of the streams with the types of bottoms.

NOTE: Be sure to have life preservers for the children who will get close to the stream (depends on age and type of stream).

YOU MIGHT WANT TO GET A STUDY OF STREAM BOTTOM PROFILES INCLUDED.

THIS WOULD LOGICALLY BE FOLLOWED BY AN ACTIVITY ON STREAM DISCHARGE.

E S T H E T I C S.....

Picture Show on Pollution

I. Introduction

For this activity, the children will listen to a song about pollution and then draw or cut out pictures to go with the song. They will then show the pictures with the music.

II. Questions

1. To lead to the activity.
   What kinds of pollution do you see around you? Have you ever heard songs about pollution? What songs have you heard?
2. To initiate the activity.
   Have you ever listened to what the songs tell you? What do they tell you? Have you ever seen the things the songs talk about in your community, movies, slides, pictures, etc?
3. To continue the activity.
   Do you think that you could illustrate what a song says? In what ways could you do this?
4. To expand the activity.
   How could you let others know about the pollution problem?
   In what other ways could you make a show about pollution?
5. To evaluate the activity.
   Do your pictures go with the song? Do they show what the song is about?
   Are the pictures in a good sequence?

III. Equipment

1. Record or tape
2. Magazines
3. Drawing materials

IV. Procedure

1. A small group (3-5) of students will choose a song to use from a selection of songs dealing with the environment.
2. The students will listen to the song and acquire a copy of the words.
3. After studying the words, they will determine what types of pictures they will need to go with the phrases of the song.
4. They may find pictures in magazines or they may draw their own to represent the song.
5. Then they put on the picture show with the music using different people to hold up the pictures.
6. This may be extended to picture taking, slides or movies on pollution to go with a particular song.
7. The children may want to compose their own song. GREAT! THIS SHOULD BE ENCOURAGED.

THIS IS A WELL-DEVELOPED ACTIVITY. LET US KNOW WHEN YOU'RE GOING TO DO IT. WE'D LIKE TO OBSERVE THE RESULTS.

Aesthetic Lesson

Grade 1

Purpose: The purpose of this activity is to have the children put themselves in the place of an animal that they have chosen. They are to first think about how they would feel if it were sunny, and then to think how they would feel if it were rainy. Next, they will illustrate on two sides of a paper their feelings about their animal in the sunshine and in the rain.

Material: drawing paper
crayons, paint, chalk, etc.

Lead-Up:
1. What is your favorite type of weather?
2. Do you like both sunny days and rainy days?

Initiation:
1. When you wake up and it is sunny, how do you feel?
2. If you wake up and it is rainy, how do you feel?

Continuation:
1. Pick your favorite animal. Make pretend that you are that animal. How would you feel if it were sunny? How would you feel if it were rainy?
2. If you were that animal and the sun was out -
   -would you hide?
   -would the sun make you feel good?
   -would you play in the sunshine, or would you just lie in the shade?
3. If you were that same animal and it started to rain -
   -would you hide?
   -would you stay out and play in the rain?
   -would you just stand still and let the rain fall on you?

Expansion:
1. On this paper, I want you to make a picture on one side that will tell me about your animal in the sunshine, and on the other side I want you to make a picture that will tell me all about your animal in the rain.

Evaluation:
1. Do you think it would begood if it were sunny all the time?
2. Do you think it would be good if it rained all the time?
3. HOW ACCURATE WERE THE STUDENTS' OBSERVATIONS?

ADDITIONAL EXPANSION:
-FOLLOW THE SAME ANIMAL THROUGH THE SEASONS
-WHAT ABOUT PLANTS?
-ACT OUT WHAT THE ANIMAL DOES
-PREPARE A "DRAMA" WITH ALL THE PLANTS AND ANIMALS THROUGH THE SEASONS OF THE YEAR

THE FORMAT IS FINE, BUT THE ACTIVITY DEALS WITH A HYPOTHETICAL RATHER THAN AN ACTUAL SITUATION. I WOULD SUGGEST THAT YOU LIMIT THEIR CHOICES TO ANIMALS THAT THEY COULD OBSERVE ON THE SCHOOL PROPERTY AND THEN HAVE THEM ACTUALLY OBSERVE THEM ON SUNNY AND RAINY DAYS.

Grade 4

Nature Picture and Haiku
(This project used for Earth Week)

I. Introduction:

This activity is designed to allow the student to become aware of the esthetic quality of his environment through an original art work and haiku poetry. This activity will be used for fourth grade students. The time required is two class periods.

II. Questions:

1. To lead to the activity
   a. How many beautiful and interesting things can you name in nature?
2. To initiate the activity, ask:
   a. How many different ways can you name to let others know how you picture and feel about the environment in which we live?
3. To expand the activity, ask:
   a. What could we do with the things we have created to allow others to see how we feel about our environment?

III. Equipment:

1. Students would have to know how to write haiku poetry.
2. An area outside to allow students to collect natural objects for their pictures.
3. Glue
4. Tape (Scotch)
5. Paper - construction and composition.
6. Students

IV. Procedure

1st period of work:

1. Review procedures for writing haiku poems---number of syllables in each line of the poem.
2. Review some ideas they could use in writing their haiku poem. (Maybe to the extent of writing one together on the blackboard).
3. Allow students to go outside and sit quietly to write their poems.
4. Have students choose the poem they like best to read to the entire class.

2nd period of work:

1. Explain to students that they will make a "nature" picture to illustrate their poem. This picture will only be made from any nature object they can find outside. Explain technique of making picture.

Continuance of project-------extending activity.

1. Through the suggestion of the students, devise a method of displaying poems and pictures for others in the school or maybe community to see. Probably a bulletin board display using haiku to title it.....

Nature makes me feel
So happy that I'm alive,
Don't spoil it for me.

NO EVALUATION
A GOOD ACTIVITY

Environmental Art Activity

Purpose: The purpose of this activity is to expose students to what is in the out-of-doors and to give them an opportunity to be creative in developing a painting or display using materials found in nature.

Materials Needed: Large sheet of paper, Elmers Glue, rubber cement, scissors, small paint brushes, some old cups and used petri dishes to mix in and imagination.

Procedure:

1. Before going outside, explain to students the purpose of the activity and ask them, "What materials might be used to provide color and texture?". Answers might be soil, burnt wood, crushed leaves, flower petals, clay from the creek bottom, fall berries, etc. Students might also list some of the berries such as:

    a. sumac berries for a dark brownish red.
    b. walnut hulls for a dark deep brown.
    c. pokeweed berries for a strong purple.
    d. goldenrod and dandelion petals for yellow color.
    e. raspberries make a deep red color.

Now might be the time to mention that some plants are very poisonous both to touch and taste. Poison ivy, poison oak, poke berry, nightshade, and jimson weed are some of the common poisonous plants in our area.

2. Also before going out try to have at least one or an example for students to see of nature art.

3. Give students approximately an hour or so during a double period to do art and return back to class.

Follow Up:

1. Next day in class give students an opportunity to explain or show work and hang it up on the bulletin board.

    a. Discuss what materials were used for the art work.

EVALUATION - PROCEDURES TO LEAD TO, TO INITIATE, TO CONTINUE, ETC. ARE MISSING.

Environmental Ethics and Asthetics

I. Introduction

This activity is designed to give a child time to reflect upon an activity in order to become more aware of his own feelings and opinions. It should be an on-going activity throughout the year. In the end it should be a record of certain events.

II. Equipment

Individual notebooks. The collected materials will vary with each child.

III. Procedure

Start with a discussion on "environment". What does it mean to us? How does it affect us? Can we affect it? How?

Everyone take the time to write what environment means to you.

What is the thing you like or dislike most about the environment? Write about it or draw a picture of it.

Why do you like or dislike this "thing" in the enviornment? Why do you feel the way you do? Explain this by writing a little to someone concerned (even if its to yourself). WHY NOT WRITE TO A PEN-PAL, ESTABLISH A SISTER CLASS IN A NEIGHBORING SCHOOL, DO THE SAME ACTIVITIES IN EACH SCHOOL.

Could the child choose something he liked or disliked? Could he express his feelings about it in some way? Was the child able to explain what "environment" means to him? After this initial activity the child may write about any activity and express himself in many different ways - from noting trivia facts to songs, or junk art.

In order to evaluate this activity, the teacher should periodically ask for comments about what was recorded that day. Although in this activity the notebook is the personal property of the individual.

FOR THE "DISLIKES" HAVE THEM CONSIDER AND POSSIBLY TRY WAYS TO CHANGE THEM FOR THE BETTER. FORMAT NEEDS ATTENTION.

Beautifing the Community

I. Introduction

This activity is designed to enable the student to become aware of the asthetics around his school and communuty; and to utilize the materials which have ruined the asthetics of his environment. This activity is designed for 20-25 students at the fifth grade level.

II. Procedures

1. Borrow the school Polaroid camera and take an ecological walk around the school and community looking for signs of debris that have ruined the beauty of their surroundings. As students locate different areas in which the beauty has been ruined, take pictures of those sites.

2. At the same time have the student gather the debris and place the materials with a container to be brought back to the classroom.

3. After the students return to the classroom, give a heavy piece of posterboard to each one and have them utilize the materials they have collected and create a piece of art work (such as a collage) showing how the materials could be used to improve the beauty of their environment.

4. As a culminating activity, display the Polaroid pictures and students' art work on a large bulletin board. The divided section could be labelled as follows:

Where it was	Where it went
Polaroid pictures	Student displays

5. Have the students show their displays on a voluntary basis telling what their work depicts. YOU MIGHT HAVE THEM SHOW THEIR WORK AND ASK OTHERS WHAT IT DEPICTS.

III. Materials

Posterboard, bulletin board, polaroid camera, containers, glue, scissors.
FORMAT NEEDS ATTENTION.

Nature Holds Poetry

I. This activity is designed to allow the child to respond to a feeling he has for nature. The response will be in the form of a poem; the poem will be illustrated by some type of art work.

II. Questions and Activities

1. To lead to the activity

   a. How do you feel when you are alone in the woods?
   b. What do you think about when you hear the phrase "the beauty of nature?
   c. If you feel sad or lonely, does taking a walk in the woods help to cheer you up?
   d. At this time, I would read to the students some poems written about nature.
   e. Hiaku poetry will be discussed and some examples of hiaku will be read to the class.
   f. A simple explanation of eyeballing will also be given to the students.

2. To initiate the activity

   a. At this time, I will take the students on a nature walk through the fields and woods behind the school.
   b. When all the students settle down in a comfortable spot in the woods, they will be asked to eyeball the environment.

3. To continue the activity

   a. What are some of the things which you recorded in your eyeball investigation?
   b. Do you think that you can write a poem using the information listed in your eyeball report?
   c. How do you feel...now, sitting here in the woods?
   d. What kind of a mood are you in at the moment?
   e. Do you think your environment has anything to do with your mood?
   f. Write at least 2 poems (haiku or any other type of poem). One poem should be written from your eyeball data, and the second poem should be written to express your feelings for nature.

4. To expand the activity

   a. Once the class is back in the room, a discussion will take place concerning the different types of art projects which could be worked on to illustrate the poems.
   b. You will now choose an art medium to work on and do a project, expressing something from your poem. (clay sculpture, photography, water color, junk art, charcoal sketching - will be some of the possibilities).

4. CONTINUED

   c. Invite other classes to read the poems and look at the works of art.

5. Evaluation

   a. Do your poems truly express your feelings?
   b. Does your art project relate to your poem?
   c. WHAT WERE THE REACTIONS OF THE OTHER CLASSES?
   d. DID THE STUDENTS PRODUCE ACCEPTABLE POEMS AND ART PROJECTS?

WHAT GRADE LEVEL?

HOW ABOUT COLLECTING AND MIMEOGRAPHING THE POETRY, OR BETTER - GIVE THE KIDS DITTO MASTERS TO WORK ON DIRECTLY?

Environmental Esthetics Activity

I. Introduction

The purpose of this activity is to give students an awareness of beauty in nature and to provide the experience of expressing what they see or feel in a useable project which combines block printing and Hiaku. This activity would be carried out by 8th grade students. Assistance will be required from the Art and English departments. Time requirements: 6 hours total time including Art, English, and Science Classes.

II. Questions

1. Lead into exercise

    a. What is "beautiful"?
    b. Who determines what is beautiful to you?
    c. Is there beauty in nature?
    d. In what ways can your impression of beauty be expressed?

III. Instruction

1. Describe potato block prints and Hiaku and have supplemental instruction from Art and English teachers.
2. Demonstrate extraction of dies from plant materials.

IV. Materials Required: Paper, potatoes, knives or other carving equipment. Plant materials for die - onions, poke, walnut hulls, etc.

V. Procedure

1. Have class visit outdoor area and each student find something he considers beautiful.
2. Have student sketch and describe fully what he chose for future reference.
3. Return to classroom and make design for writing paper depicting students topic.

    a. Can be abstract, realistic, etc.
    b. Can be in several parts to be superimposed by separate blocks.
    c. Other ideas from Art class.

4. Carve design in potato.
5. Compose Hiaku to relate to topic.
6. Carve words or lines into potato.
7. Prepare dies.
8. Stamp a print design onto paper.

VI. Follow up. Paper is for use in English project with pen pals. At least one of the letters to the students pen pal should contain the description of the topic chosen as the theme for paper design.

A GOOD IDEA. RATHER THAN DEMONSTRATING THE EXTRACTION OF DYES, YOU MIGHT CONSIDER CHALLENGING THE STUDENTS TO COME UP WITH THEIR OWN METHODS.

EVALUATION IS LACKING.

AIR.....

Air Pollution in our Community

I. Introduction

This activity is designed to allow the students to identify the areas of greatest and least pollution in their community and to use the data to complete a community map showing the areas of greatest and least pollution concentration.

II. Procedure

1. Place air pollution detection devices at the following locations within the community.

   a. Classroom - a strip of flypaper
   b. Near a busy intersection - a strip of flypaper
   c. Parking lot - petroleum jelly covered cardboard squares
   d. Quarry - use white bathroom tissue
   e. Small field or garden - jar with marking tape wrapped around
   f. Service station - strip of flypaper.
   g. Air conditioned store - strip of flypaper
   h. Cannery - jar with marking tape wrapper around.

2. Place the pollution detectors in a location for one week at which remove the devices and examine them with a magnifying lens.

3. Obtain a map of the community. Draw on the map the different areas where the pollution detection devices were placed.

4. Set up a key on the bottom of the map and have the students use different colors to show the various degrees of pollution.

   a. Red - severly polluted
   b. Yellow - moderately polluted
   c. Green - slightly polluted

5. Color the areas on the map according to what the students observed on their detection devices.

III. Evaluation

At the end of the activity, have the students respond to the following questions.

1. Where does the air pollution tend to occur most frequently? Why? Least frequently? Why?

2. What materials have the pollution devices collected?

3. Where did the pollutants come from?

4. What can be done to prevent or reduce air pollution?

5. What effects has pollution had on our community?

IV. Materials

1. Petroleum Jelly

2. Cardboard

3. Flypaper

4. Tape

5. Thumbtacks

6. Jar

FORMAT NEEDS ATTENTION. DIFFERENCES MAY BE A RESULT OF THE DIFFERENT METHODS OF COLLECTION. WHY NOT USE THE SAME TYPE (s) OF COLLECTORS AT EACH SITE?

Air Activity

I. Introduction

This activity, which introduces the children to simple air study techniques, can be expanded into a transitional activity if this is deemed necessary.

1. To lead into the activity

   a. What is air pollution?
   b. What are some of the sources of air pollution?
   c. Is air pollution a problem in the world today?
   d. Which of these sources affect the environment that you live in?
   e. Is air pollution in the local area more apparent on certain days than it is on others?

2. To initiate the activity

   a. Where does most of the air pollution in this community come from?
   b. Is there any way that we can test different areas of the community for amounts of air pollution?
   c. What are particulates?
   d. Activity - Talk to the students about how they can construct the simple particulate samplers such as the vaseline coated microscope slide, masking tape around a jar, etc. and have the students gather these materials.
   e. Talk to the students concerning the use of pinto beans as an indicator of SO_2. Pass out the beans to be planted.

3. To continue the activity

   a. How could you use a camera in your study of air pollution?
   b. What different places within the community would you like to test for SO_2.?
   c. Where would you like to test for particulate matter?
   d. Activity - take the students out into the community - bringing along cameras, pinto bean plants, vaseline coated slides, jars stripped with masking tape, toilet paper, notebooks, and pencils. The testing equipment should be dropped off at previously designated areas throughout the community. After a few days, the equipment and testing samples should be picked up and brought back to the classroom for analysis.

4. To expand the activity

   a. Did you find as much pollution as you expected to discover?
   b. Which area of the community seems to be hardest hit by air pollution?
   c. Do you see air pollution as being a major problem in the local environment?

d. Whose responsibility is it to recommend possible solutions to the problem?
e. Are there laws concerning air pollution?
f. Are they enforced?
g. Can we set up an air quality testing station? Set up a testing station - making periodic reports to the rest of the school concerning the quality of the local air according to the field test results.

5. To evaluate the activity

a. Did the students draw accurate conclusions from the collected data?
b. Did the students use their time efficiently?
c. Was anything accomplished by doing the activity?

Equipment - Cameras, toilet paper, slides (microscope), vaseline, masking tape, jars, ringleman charts, pinto beans pots.

A GOOD ACTIVITY.

Air

Purpose: The purpose of this activity is to discover the effect that air has on plants. Three similar plants will be obtained. One of the plants leaves will be covered with vaseline. The second will have half of its leaves covered with vaseline, and half without. The third will have no vaseline on any of the leaves. All other conditions will be the same.

Materials: 3 plants of same species, vaseline.

Lead-Up: What are some of the things that people need to live? (guide answers to air)

Initiation: What else on our earth also needs air to live? (Lead answers to plants)

Continuation: What do you think would happen if we closed up all of our noses for a long time?

Do you think the same thing would happen to plants if we covered up the holes that they breathe through?

Expansion: Lets take three plants. The first one we will carefully put vaseline on all the leaves. The second we will put vaseline on some of the leaves. The last one we won't put vaseline on any of the leaves. We will water the plants the same. Then we will watch and write down what happens.

COULD YOU CALL THIS "CONTINUATION" AND "EXPAND" BY LEADING THE KIDS TO DISCOVER YOUR DUST COVERED QUEEN-ANN'S-LACE? WHAT MIGHT THEY FIND IN NATURE THAT COULD PLUG UP THE PORES? ALSO BE SURE THAT THEY ARE EXPOSED TO SAME TEMPERATURE, LIGHT, SOIL, ETC.

Evaluation: Do you think that all plants need air?

Could we live on earth if there were no air on it?

Air Pollution Activity

Particulate Matter Dispersal in the Upper Perkiomen Valley.

Introduction: This activity is set-up to show how particulate matter is spread over a large area and to develop a map showing zones of concentration of particulates in our school district. If this activity is successful, possibly some background into the sources might also be determined. We do not have a lot of fluming smokestacks in the area but the automobile traffic and number of housing projects is rapidly increasing.

Materials Needed: Microscope slides, vaseline, masking tape for identification labels, magnifying glasses and binocular scopes, construction paper, paints, rulers, and a detailed map of the Upper Perkiomen School District.

Procedure:

a. Have students make a large map, 3 feet by 10 feet, showing the area of the Upper Perkiomen School District. Label and indicate roughly to scale major towns and roads.

b. Each student (about 140) should determine about where he lives on the map and then write his or her name at that spot. If not all areas of the district are represented, extra slides could be placed in these areas to give a complete survey.

c. Provide each student with a microscope slide to take home to cover with vaseline. Have these placed in an exposed area where particulate matter can collect on them.

d. After two weeks bring the slides back to class, analyze them, and place them on the map to compare and see where the dirtiest places are.

Some thought questions to discuss while the slides are out:

a. What might be some sources of particulate pollution in the Valley? in the towns? in rural areas?

b. Where do you think the heaviest concentrations will be found?

c. Will town areas be more affected than rural areas?

d. Can anyone describe places or examples where dirty air has affected their lives?

Follow-Up:

a. After slides are back, have classes draw conclusions based on results as to where the dirtiest areas are.

b. Try to determine what the pollutants are as to dust, pollen, oil drops from chimneys, oil from car mufflers, etc.

c. Maybe the study will show that some areas will have to be studied in more detail.

d. Prepare a list of ways that individuals can help keep dirt out of the air such as a properly tuned car, regular chimney and furnace cleaning, planting over bare exposed ground that may be blowing away, etc.

WHAT TYPES OF EVALUATION COULD THERE BE?

YOU ARE GETTING MORE NARROW IN APPROACH, BUT GET NARROWER STILL. WE CONSIDER MAP MAKING ONE ACTIVITY AND THE SLIDES ANOTHER. DOING BOTH IS A GREAT IDEA.

Air Filter

I. Introduction

The children will filter air from the classroom to see if they can collect any particles.

II. Questions

1. To lead to the activity: Are there things in the air around us? What kinds of things are in the air?

2. To initiate the activity: Do you think there might be things in the air in our classroom? How could we find out if there are things in the air in our classroom?

3. To continue the activity: What is in the air? Where do you think the particles came from? Are the particles all the same size?

4. To expand the activity: Do you think the air in other classrooms would have the same particles? Would the air outside have the same? The air near your home?

5. To evaluate the activity: What are these particles? Where did they come from? Are the ones from the classroom different from particles found at other sights? How are they different? "WHAT HAVE WE COLLECTED?" WOULD BE A LESS DIRECT WAY OF PUTTING IT.

III. Equipment

1. Vacuum cleaner

2. Piece of window screen

3. White tissue paper or filter paper

4. Hand lens and/or microscope

IV. Procedure

1. The project will be done with groups of 2-4 children.

2. First start the vacuum cleaner, put window screen across the vacuum hose, place tissue or filter paper on the screen over the opening.

3. Observe what happens.

4. After a few minutes, examine the tissue or filter paper under a hand lens or microscope.

5. Note any difference in size. Try to identify the particles collected (where they came from, what they are).

6. The children may choose other sites to do the same procedure and then compare the results. AN OUTDOOR SITE WOULD DO WELL HERE.

V. Variation

Use a chalkboard eraser and blow toward filter (colored chalk particles will show up well).

A GOOD ACTIVITY

Use of Various Tests to Detect Air Pollution in Our Environment

I. Introduction

This activity is designed to allow the student to become aware of pollution in the environment in which he lives. This activity is to be used for fourth grade students. Actual time to complete the entire project is about two weeks -- two periods to initiate the lesson.

II. Questions

1. To lead to the activity:

   a. What is air pollution?
   b. What could cause air pollution?
   c. Can all air pollution be seen?

2. To initiate activity ask:

   a. What devise could we use or make to detect air pollution?

3. To continue the activity:

   a. Where are places in our community where you would feel that the most pollution would be evident?
   b. What things must you know about an area you feel is producing air pollution?
   c. What type of tests could be used at each site?

4. To expand the activity:

   a. How could we get an over-all reading of the amounts of air pollutants in our community?

5. To evaluate activity:

   a. Which place had the most evident pollutants; least evident? Why?
   b. What type of pollutants were evident at each site?
   c. Which method did you use to detect each pollutant?
   d. What could have caused these pollutants?
   e. How might they be reduced? Could you design? How could you design a system to bring

III. Equipment

   a. Germinated pinto beans.
   b. Microscope slides
   c. Vaseline

d. Hands lens
e. Microscope
f. A map of the community
g. Masking tape
h. Baby food jars - for entire class
i. Bathroom tissue
j. Nylon hose
k. Slide mounts
l. 3 small pieces of wood
m. hammer
n. 6 nails
o. 3 rubberbands

IV. Procedure:

1st. Lesson

1. Discuss definition of air pollution. (Discuss "leading" questions making sure students understand answers)

2. Have students decide where they feel the places to be studied should be selected. (Lead them gradually to the three places you have decided - airport, busy intersection, plastics company). They may come up with better suggestions. GOOD

2nd Lesson

3. Have them make devices for testing air pollution. Make sure they know how to use them and collect the data.

4. Go to the sites and eyeball them. Place pollution detection devices there.

5. Allow to collect pollution for about 2 weeks.

6. Collect data and form conclusions. Working toward answering "continuing" and "evaluating" questions.

7. Have them take testing devices home to get an over-all picture of pollution in community. Make color-coded map of community (showing highly polluted to low polluted areas). Make sure they know causes.

V. Limitations:

1. Transporation to polluted sites

2. Objection from those who own area to test it .

THIS COULD LEAD TO THE ESTABLISHMENT OF A MONITORING PROGRAM. YOU COULD ALSO LEAD TO A SURVEY OF NATURAL VEGETATION.

Air Studies

Introduction:

To find out some of the particulates that are in the air in our locality.

Procedure:

1. Lead Into - How can we collect particulates in the air? Make the equipment suggested by the children.

2. Initiate - Bring collection equipment to specified locations and keep one in the classroom.

3. Continue - Leave the equipment for a specified time. Let's try to predict what our results might be. Collect them when ready.

4. Expand - Compare the results from the different places. Did they have the same type of particulates? Was there a great difference in amount? Have them compare these results with samples from around their home. Try to predict what the results of this comparison will be.

5. Evaluate - What do you think caused the particulate? Why are some of the samples similar or different? What might be the reason for some of the results to be different than what we expected? How could we measure the amount of particulate from the different areas?

IF MANY DIFFERENT SAMPLERS ARE MADE, DIFFERENCES MAY BE CAUSED BY THE SAMPLERS AND NOT THE LOCATIONS.

A GOOD ACTIVITY.

WHAT AGE GROUP?

Air Quality Activity

Natural Air Cleaners

I. Introduction

This activity is combined with the meteorology studies, specifically the study of precipitation and the use of the rain guage. It will be conducted by grade 8 students at awareness and transitional levels. The activity should indicate to the students relative amounts of particulate matter in the air and demonstrate the effect of rain or snow in removing such matter. Acidity of the rain water will also be calculated. The activity should also motivate and introduce further air monitoring studies.

II. Questions

1. What benefits are obtained thru precipitation?
2. Would you drink rain water - eat snow?
3. Have you taken a close look?
* 4. Where did the dirt come from?
5. Would time lapse between rains affect amount of particulate found in the water?
6. Would location affect the amount found?
7. Would there be more found in first 1/4" of rainfall? 2nd 1/4"? etc.
8. How could the amount be measured?
9. Can you see all of the matter washed out?
10. Can the chemicals be measured?

III. Instruction

Outline procedures to be used in conducting quantitative particulate test in water. Also pH tests. Discuss implication of supplemental factors such as wind velocity and direction prior to rain, length of time since last rain fall, location, etc.

IV. Equipment

Large trays for water collection, ruler for measuring water depth, jars for holding water, filters, and filtering system, low power microscope, water pH kit.

V. Procedures

1. Keep close watch on weather indicators as studied in meteorology unit for approaching warm front and rain.

2. Just prior to beginning of rainfall set out trays in selected sites.

3. After each 1/4th inch of rain accumulation, pour into jars and replace tray for next 1/4" of rain. (use 2 inch for snow)

4. After samples have been collected, run pH test on each sample and record data.

5. Run each sample thru a filter.

6. Compare filters for variation in discoloration and visible particles.

7. Compare all data and draw conclusions relative to variables - location, part of rain fall,etc.

8. Repeat for each rainfall and add span between rainfalls and variables for comparisons.

VI. Follow Up

Discuss other air sampling devices and their possible use in the community. Could lead into establishment of air monitoring stations.

VII. Limitations

Inconveniences in time of rainfall.

VIII. Evaluation

Measure degree to which tests match predicted results. Observe motivation and awareness it gave students by their interest and enthusiasm in setting up air monitoring stations.

* YOU ARE PRESUPPOSING THAT THERE WILL BE "DIRT" PRESENT. EVEN THOUGH THERE PROBABLY WILL BE, LET THE STUDENTS DISCOVER. ANOTHER WAY TO GET AT THE SAME THING WOULD BE: "CAN YOU FIND ANY CONTAMINANTS IN THE RAIN WATER?"

Soil and Sediment

Purpose: The purpose of this activity is to have the children become aware that sand, soil, clay, and rocks make up our earth.

Materials: Containers of sand, soil, rocks, and clay, jars, water.

Lead Up: What are some of the things you might see outside? How long do you think they might have been there? WHAT HAPPENS TO STREAMS AFTER A HEAVY RAIN? WHERE DO PLANTS GET THEIR "FOOD"?

Initiation: What do you think is inside of mountains? What do you see a lot of at the seashore? What do you see in your garden?

Continuation: Apply these questions to all four substances. Is it hard? Is it soft? Is it big? Is it little? What color is it? Is that the only color it can be? Is it smooth or rough?

Expansion: Place a sample of soil, a sample of clay, a sample of sand and a sample of rocks in a jar. Put some water in, shake the jar, and let the contents settle. Children will discuss the results and give possible reasons for the outcome.

Evaluation: Why do we need sand on earth? Why do we need rocks on earth? Would it be a good thing if all the earth were made up of clay? How about soil?

CONSIDER A TIE-IN WITH EROSION ON THE SCHOOL GROUNDS.

Soils Activity

Nutrient Requirements of Plants

I. Introduction

The purpose of this activity is to have the students determine the requirements of N, P, K and pH for plant growth, as well as to show difficiency symptoms. The activity will consist of growing plants in a sand culture varying the availability of specific nutrients thus inducing known difficiencies.

The results of this activity should demonstrate to the students the need of soil fertility for plant growth as well as to show land use limitations from low fertility. The students should also learn to recognize difficiency symptoms.

The activity would be conducted by 8th grade students and would be a continuing activity requiring approximately 5 class periods to set up and only periodic care, observation, and analysis after initial period.

II. Questions

What do plants require for proper growth? Where do plants get these requirements? What happens if they are not available? Can we control the availability? How?

III. Instruction and Class Discussion

1. Explain water and sand culture as presented in Growing Plants Without Soil. D.R. Mattin. Chemical Pub. Co., Inc. N.Y.,N.Y., 1940.

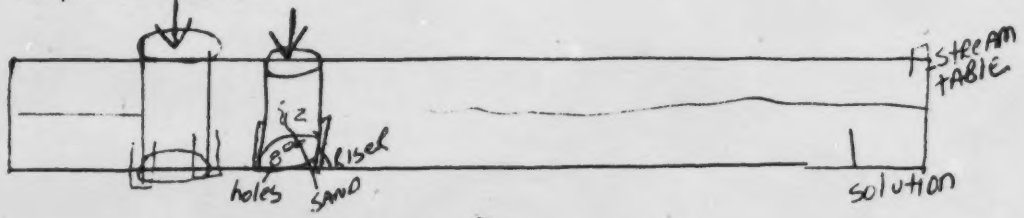
2. Have class devise ways to delete certain nutrients from the formulas to plan what plants to use, and to construct required equipment.

IV. Materials

Containers, #10 cans from cafeteria. Stream table to place containers. Sand from stream bed after screening. Plants or seeds, chemicals as specified in text.

V. Procedures

1. Prepare containers.



2. Mix solutions: a complete solution and one each with a specific difficiency of N, P. K, and too high and low pH.

3. Proper care and observation.

4. Devise growth charts etc. as analysis.

VI. Follow Up

Introduce experiments with other true nutrient requirements, with toxic materials or herbicides, etc.

Apply some requirements as they must be supplied by soil - use soil test kits, recommend fertilization rates or other conservation practices.

Introduce possiblity of hydroponics replacing dirt farming and debate issue.

VII. Evaluation

Determine how closely the resulting difficiency symptoms match standards.

Observe motivation of students thru their interest in caring for and in their observations of plant growth. Also thru their enthusiasm devising other tests. Watch for transfer of learning into actual soil studies.

PLEASE INDICATE "LEAD TO", "INITIATE","EXPAND", ETC.

A GOOD ACTIVITY

Soil Studies

Introduction

This activity may be used for a variety of reasons as was the activity on macro-organisms in a stream. I would use it as an initiatory activity to study the "health" of the soil (ability to support a variety of species).

Materials

Funnel, a stand to hold the funnel, soil sample, a light source above the funnel, gauge, basin or jar, and alcohol

Procedure

1. Lead Into - What is soil? Why do we have the type of soil we have and not another?

2. Initiate - How can we tell if soil is "healthy"? How can we find out if our soil is "healthy"?

3. Continue - Make the Berlese Funnel in order to sample the macro-organisms in the soil. Set up the funnel and collect the organisms at the end of the day. How can I further preserve the samples?

4. Expand - Make a display with the specimens. Let the class label them and find out something about each. The class may want to do a Diversity Index for a certain area of the soil.

5. Evaluate - Does the number of species always determine or indicate the "health" of soil? What else might affect it?

From here I could go into What animals need in the soil in order to live; or, testing for nutrients. AND TESTING SOIL FROM DIFFERENT LOCATIONS.

How long can the specimens be left in the alcohol? AS LONG AS YOU WISH. I HAVE SOME THAT HAVE BEEN PRESERVED LONGER THAN 10 YEARS .

Making Soil Comparisons Through the Finding of Macro-organisms

I. Introduction

This activity allows the student to notice a probable difference of the number of species of macro-organisms found in eroded soil and soil which appears in better condition. The activity is designed to permit the student to draw conclusions about what type of soil supports more living things. Entire activity will take 24 hours and two class periods.

II. Questions

1. To introduce activity:

   a. How can you tell eroded soil from less eroded soil?
   b. What are some things which live in or on the soil?
   c. What type of soil is usually on the top of the ground?

2. To initiate activity ask:

   a. What kind of tests could we run to find out if the soil is good or poor?

3. To continue activity:

   a. What type of test could we run to find out how many macro-organisms are in the soil?

   b. Where would some good places be to test the soil around our school?

   c. What must we do to the area around the soil before we test it?

4. To expand the activity:

   a. What other tests could we run to find out more about our soil samples?

   b. What could we do to the poor soil to make it better?

   c. What must we do to the good soil to keep it that way?

5. To evaluate activity ask:

   a. What are some differences between good and poor soil?

   b. In what type of soil did we find more macro-organisms? Why?

III. Equipment

Two funnel testing devices, shovel, something to put soil samples in, paper and pencil, students.

IV. Procedure:

1. Make sure students have necessary background about soil.
2. Choose areas to be tested.
3. Eyeball areas to be tested.
4. Collect soil samples from areas.
5. Set up two Berlese Funnel tests. Run test for macro=organisms. Allow to stand over night or for at least a 24 hour period.
6. Separate different species of macro-organisms and count the number of organisms in each species.
7. Compare each tally of different areas of soil tested.
8. Draw conclusions using evaluation questions as guide.
9. Allow students to run their own devised tests on soil samples

THIS IS A WELL-DESIGNED ACTIVITY. YOU MIGHT CONSIDER USING MORE THAN TWO TYPES OF SOIL. YOU MIGHT ALSO SHAKE SOME OF EACH TYPE IN WATER AND WATCHING FOR THE "CRITTERS" THAT FLOAT UP OR MOVE TO THE SOIL-WATER SURFACES. COMPARE.

Soil and Sediment Studies

Comparing Soils by Growing Plants In Them

I. Introduction

Using four different soil samples, the children will plant seeds and compare the rate of growth of the plants.

II. Questions

1. To lead to the activity - Are there different types of soil? Where could you find different kinds of soil?

2. To initiate the activity ask - How are the soils from the various places different? Do you think plants would grow at the same rate in the different types of soils? How could you compare their rate of growth?

3. To continue the activity - In which of the soil types do you think the plants will grow fastest? Slowest? Why?

4. To expand the activity - What do you think will happen to the seeds in the cotton? What is different about each of the soils? How could we find out about each type of soil?

5. To evaluate the activity - Which plants grew fastest according to your records? Slowest? How do each of the plants look? Which was the best soil in which to grow these plants? How do the plants grown in soil compare with the ones grown in cotton?

III. Equipment

Soil from four different locations, flower pots, cotton, bean seeds.

IV. Procedure

1. The children will collect soil from 4-5 different spots. Suggested locations might be a) topsoil from a pasture b) soil from eroded hillside c) subsoil from 3-4 feet deep may be taken along road bank d) another sample might come from a woodland or an old lake bed.

2. The soil will then be put into well-marked flower pots.

3. Then the children plant 3-4 beans in each pot. These beans may have been soaked overnight to speed germination.

4. The pots should be kept watered and be placed where they will be warm and have some sunshine.

5. While doing this have the children also plant 3-4 beans in cotton and have them keep it moist.

6. Compare the rate of growth of the plants. A record should be kept of how fast the beans in each pot grew and of how they looked.

7. Compare the plants grown in soil with the ones grown in cotton.

8. The children may want to try the same comparison methods with a different type of seed and then compare the results with the plants.

THIS COULD LOGICALLY BE FOLLOWED BY PLANTING SOME SEEDS IN DIFFERENT SOILS IN THE "REAL" WORLD. I'M NOT SURE OF YOUR REASON FOR INCLUDING THE COTTON.

Soil Conservation

Comparing Soils by Growing Plants in Them

Introduction

Behind our school we have a large bank that is bare and is eroding. The bank is not natural but was made from rough fill and then covered with subsoil. The students are quite familiar with it since the bank has become an eyesore. It is sown periodically with seed but as the soil dries, it becomes rock-like, and without watering the seed either blows away or dies. This year the 7th grade life science classes are going to "try" to get some larger trees and plant them in the bank with the hope of getting them to root and grow.

After some background information into a soil profile and its characteristics, this activity of growing plants on different kinds of soils might help in having the student understand how organic matter and organisms in the topsoil make this the best layer of soil for plant growth.

Materials Needed

Small flower pots, soil from the eroded bank, topsoil from a fence row or pasture field, subsoil, woodland soil, cotton, and some pea or bean seeds.

Procedure:

1. Fill flower pots with soil from the following places a) topsoil from an old fence row or pasture; b) soil from eroded hillside; c) subsoil,; d) woodland soil; e) and one pot with cotton.

2. Plant a few seeds in each pot.

3. Compare the rate of growth. Keep a record by making a chart similar to below:

	How Long Before Plants Emerged	Growth in one week after emergence	Growth in two weeks	Growth in 3 weeks
Topsoil				
Soil from eroded hillside				
Woodland Soil				
In Cotton				

Evaluation:

1. In what soil did plants grow best?
2. Where does a plant get its food from?
3. How does organic matter help a plant to grow?
4. Is it possible to find a subsoil that might grow plants better than topsoil?
5. In planting trees out in the eroded bank, what would have to be done to the soil before plants could be grown in it ?
6. What happened to the plants growing in cotton?

Other related activities:

1. A soil chart comparing the humus, clay, silt, sand, and rocks could be done with the above soil types.

2. It might be interesting to take large cans, cut out the ends, and placing them outside on these soils, see which holds water better.

3. Might be rewarding to compare living organisms in these soil types or even do the Berlese funnel technique. Healthy soils usually have a higher or greater diversity of living organisms.

4. Make a comparison (demonstration) on the effect of soil cover (grass) as compared to bare soil when water is sprinkled on it. Which washes away the easiest.

PLEASE INDICATE "LEAD TO", "INITIATE","EXPAND", ETC.

A GOOD ACTIVITY WHICH WILL LOGICALLY BE FOLLOWED BY THE ACTUAL "ATTACK" ON THE BANK. IF THE SOIL IS REALLY BAD, I SUGGEST PLANTING GREY BIRCH. WHAT IS THE PURPOSE OF THE COTTON?

Soil Experiment

I. Introduction

The purpose of this lesson is to allow the student to become aware that soil from different areas is not all the same, and that some soil is more suitable for growing crops than other soil.

II. Questions, activities, procedures

1. To lead to the activity:

   a. What is soil?
   b. How is soil important to plants?
   c. Do you have any idea how soil is formed?
   d. A short discussion on rock formation will take place at this time.

2. To initiate the activity:

   a. The students will be told that they are going to plant some seeds in soil taken from their home, so they should gather up some soil from around their house (preferably from a garden area), put the soil in some type of container, and bring it to school.
   b. For the next exercise, students will exchange their samples of soil. At this time, the students will eyeball the soil that they have in their possession.
   c. What did you notice about the soil that you eyeballed?
   d. How are these soil samples different from each other?
   e. In what ways are these samples the same?

3. To continue the activity:

   a. How can we find out which soils are the best for growing corn?
   b. Each student will be given a pot or cup, or cups, to put his soil into and he will also be given 3 or 4 corn seeds to plant in this soil.
   c. The seeds will be planted at the same time and then the cups will be placed on the window sills.
   d. The students will be asked to record the date of planting, the date that the sprouts emerge from the soil, and the subsequent daily growth of the plant (measured in inches).

4. To expand the activity:

   a. I will put a topographic map of the local area up on a bulletin board. Each student will mark on the map, the location that his or her soil sample was taken from. Pins can be used as markers. The students could make little flags out of paper to identify which pin is their own.

b. After a period of two or three weeks, the winning soils can be determined by seeing which corn plants are the tallest and look the healthiest.
c. What makes some soil better than other soil for growing corn?
d. A discussion of nutrients and pH will take place at this time.
e. The areas that seemed to have the best soil for growing corn will be plotted on the topographic map.

5. To evaluate the activity:

a. What did you learn from doing this activity?
b. How accurate are the records that you kept?
c. How could you find out what to do if you wanted to try and improve your soil for growing crops.

III. Equipment

Soil from each student, styrofoam cups or pots, corn seeds, rulers, a topographic map of the area.

YOU MIGHT WANT TO COMPARE YOUR MAP WITH THE SCS SOIL MAP FOR YOUR AREA. THIS COULD THEN BE FOLLOWED BY TESTS IN THE "REAL" WORLD.

Soil - Acid, Neutral, Alkaline

I. Introduction

This activity is designed to enable the students to become aware of the acidic and alkaline content of the soil surrounding their home. This would be an interesting activity for the students since there are many soil varieties within the school district.

II. Procedure

1. Each student is to take a soil sample from the area around his home, as well as actual samplings of vegetation that grow near the area where the soil samples were taken.
2. The students are to place the soil contents in a jar and identify the samples by their name and location.
3. The students are to bring samples of plant life that are common to the area where the soil samples were taken.
4. The students are to place the soil and vegetation samples in an assigned area in the classroom.
5. The students will conduct the pH test by using the LaMotte kit equipment and directions.
6. At the conclusion of the experiment, the student will draw the general location of their home on the community map as well as the pH reading.

Present the following questionnaire to the students for an evaluation.

1. What type of plants thrived in the soils that had:
   a. A high alkaline reading
   b. A high acidic reading
   c. A neutral reading
2. Did the soils with different pH readings support the same vegetation?
3. Which area had similar pH readings? Different readings?
4. What types of soils had a
   a. High alkaline content
   b. High acidic content
5. Did the alkaline and acidic areas support different plant life?
6. What relationships did you notice between the plants and soil?

III. Materials

Shovel, jar, container for vegetation, outline map of the community, LaMotte equipment.

PLEASE SHOW A BREAKDOWN INDICATING LEAD TO, INITIATE, CONTINUE, ETC.

IN MOST CASES, ITS THE DOMINANCE (IN TERMS OF NUMBERS) OF PARTICULAR PLANT SPECIES THAT INDICATE SOIL TYPES....NOT JUST THE PRESENCE.

SOLID WASTE....

Solid Waste Activity

Introduction

Nature has its own recycling process in that materials in one form or another are used over and over again. Man uses many things only once and then discards them.

Procedure:

1. Lead Into - In the classroom, display examples of our modern, throw-away containers (maybe in the form of the trash can we made). Why do our products seldom come in reusable containers any more? (I might also use an article Sunfish Pond Revisited The Sunday Bulletin, July 21, 1974).

2. Initiate - Have the class discuss what happens to these articles after they are discarded. Of what materials are reuseable containers and discards made? Do these materials readily return to their sources?

3. Continue - How are we hindering nature's process of recycling? How can man reduce the amount of waste he produces? What can individuals do to limit waste?

4. Expand - What is "planned obsolescence"?

5. Evaluate - Could the class discuss the questions, express their feelings, and give examples?

THIS DOESN'T INCLUDE ENOUGH "HANDS ON" ACTIVITIES FOR THE STUDENTS. IT IS ESSENTIALLY A DISCUSSION. HOW COULD YOU GET THEM MORE INVOLVED?

Litter

I. Introduction

This activity is designed to allow the student to become more aware of the litter problem in his community. This activity is for fourth grade students. The amount of time is two class periods.

II. Questions

1. To lead to the activity:
   a. Have you ever littered?
   b. Where did you litter?
   c. What made you litter?
   d. When did you litter?
   e. What was the item you littered?
   f. How much did you litter?
   g. Why is there littering?
   h. Is it a problem?

2. To initiate the activity:
   a. Is there anything you can think of to make you stop littering?
   b. Does Perkasie do anything to make you stop littering?
   c. In what part of our community does littering occur the most? The least? Why?
   d. What can we do to find out?
   e. What areas should we survey?
   f. What must we do to the areas before we collect?

3. To continue activity ask:
   a. What kind of litter did you find?
   b. What kind of graph can we make to depict the amounts of litter you found in each area?

4. To expand activity:
   a. What could we do to help stop the problem of littering in our community and school?
   b. Are there any laws against littering? Are they enforced?

5. To evaluate activity:
   a. Did they relate the litter activity to themselves?
   b. Did they come up with any reasonable conclusions to help stop the problem?
   c. Did they know if their community did anything about the problem and were they willing to find out?

III. Equipment

1. Paper bags to collect litter.
2. Graph paper.
3. Cameras to take pictures.
4. Paste, stapler, tape.
5. Collection barrel to decorate.

IV. Procedure

1. Use questions to initiate lesson
2. Choose sites
3. Do surveys, making sure they eyeball area first.
4. Make graphs
5. Draw conclusions from data collected.
6. Decorate collection barrel with litter collected.

AFTER THE DATA ARE COLLECTED, HELP THE STUDENTS WITH ANALYSIS TO DETERMINE POINTS OF ATTACK.
A GOOD ACTIVITY.

Bottles Around the Block

I. Introduction

The class will divide into teams and collect glass containers in a given area. They will then discuss what they find.

II. Questions

1. To lead to the activity: What kinds of glass containers do you think you can find in the communuty? What areas do you think will have the most glass containers?
2. To initiate the activity: Do you think you would collect many glass containers? How many different kinds do you think there would be? Who might put the containers where you find them? Why?
3. To continue the activity: What was the container used for? Could the container be reused for the same use? For another use? Why isn't it being reused? Could the glass be used to make something else? Why isn't it?
4. To expand the activity: What could you use the container for? At home? At school? In the community? Could you make anything new from the glass? What? How?
5. To evaluate the activity: What team got the most glass? Where did the team get it? What were the containers used for? What can be done with used glass?

III. Equipment

1. Containers for collection and storage.

IV. Procedure

1. Choose an area to collect the glass and divide it into sections.
2. Divide the class into teams and assign them an area to cover.
3. The team will take containers for collection and collect as many glass containers as possible.
4. Then they discuss how the containers could have gotten there, what their use was, if the glass could be reused to make something else, etc.
5. The teams would then compare what they found and compile any information they might want.
6. They might also look into glass recycling as a solution to what to do with the glass.
7. THEY COULD PRESSURE COMMUNITY & LEGISLATORS FOR A "BOTTLE BILL" OR SOMETHING SIMILAR.

V. Variation

1. They might use crushed glass for art activities. They could make useful objects by molding or sculpting with a glue.

A GOOD ACTIVITY

Recycling Paper Project

Introduction: In the reader, "A Primer on Solid Waste", it was stated that of a ton of municipal wastes about 920 pounds would be discarded paper.; the largest general category of wastes. In the life science classes, we have had a small collection project where about two tons of paper are collected over the school year. What might be possible would be to expand the project to involve more of the school. Since trees are the source of paper the money received from this might be used to buy trees in the spring to plant on an eroded and bare part of the school grounds.

Materials needed: Hammermill paper-making kits, boxes, paints, etc. for making collection centers for paper.

Procedure:

a. Complete the activity "Recycled Paper in Schools" as an introduction. This was provided by KARE.
b. Make paper in class using the program developed by Hammermill Pulp and Paper Company. This gives students a good idea of the energy and materials that go into making a sheet of paper.
c. Show the film, "Paper, Messenger of Manking" which shows the many uses of paper and the commercial process of making it.
d. Order in quantity the brochure: "Paper from Paper, Not from Trees, All about Recycled Paper" from Marcall and read and discuss in class.
e. At this point have students make suggestions for starting a collection project.

Some questions that would have to be decided are:

a. Where and how much could paper be sold for?
b. Should paper be separated into types?
c. Is it possible to place collection boxes in all the classrooms? Who would do the collecting work and how often would it be done?
d. Should a core group be responsible for record keeping and managing the project?
e. What role would administration play in the project?

Evaluation:

a. Were students enthusiastic?
b. Did the project keep going for the year?
c. Was the goal of doing something for the school as far as planting trees or some related project realized?
d. Did students see the need for reusing paper and was a sincere realization reached?

THIS IS A GOOD FOLLOW-UP ACTIVITY. PLEASE USE THE "LEAD TO", "INITIATE", FORMAT. (AN ASIDE: I SPENT ONE SUMMER WORKING AT HAMMERMILL PAPER CO.).

Project - "Solid Waste" in the Middle School

I. Introduction

This activity is designed to help the students become aware of the solid waste materials that are discarded inside and around the school, and to initiate an active solid waste program to counteract the careless disposal of solid waste in and around the school.

II. Procedures

1. Set an example of a decorated trash barrel using solid waste and slogans near the main entrance of the school.
2. Place a special notation on the sample barrel inviting other students who are interested in expanding this solid waste activity to contact teachers who have consented to be involved in the program.
3. Have students who are interested in expanding this project work as a group during activity period--collecting solid wastes in and around the school, as well as composing attractive slogans and expressions, and decorate their barrels.
4. Distribute the barrels throughput the school in convenient locations.
5. Have different students give periodic catching announcements over the PA system urging the students to support "Project Solid Waste".

III. Evaluation throughout the year

1. Periodically talk with the custodians to find out whether project solid waste has decreased or increased the amount of solid waste materials around and in the school.
2. Prepare a student questionnaire asking them to tell how they felt about the project.
3. Ask the students if they have any other suggestions to offer to make their school cleaner.

The enthusiasm generated by the students could possibly lead to implementing the program into the community by involving different organizations and concerned citizens.

PLEASE BREAK OUT: "LEAD TO", "INITITATE", "CONTINUE", ETC.

Solid Waste Activity

Purpose: The purpose of this activity is to help the children become aware of the amount of litter around the school grounds and to help them realize that we must all do our share to keep our school clean.

Materials: Litter bags or baskets.

Lead-Up:
1. If you are out on recess and you just finished eating a candy bar, what should you do with the paper?
2. Do you think all the boys and girls use the litter basket all the time?

Initiation: Take the children outside on the schoolground. Have them observe all the paper, etc. lying on the ground.

Continuation:
1. Do you think our schoolyard looks very nice with all the paper on it?
2. What do you think we can do to help make our schoolyard look better?
3. For about ten minutes have the children collect the litter and place it in the basket.

Expansion:
1. Take the litter into the classroom. Have the children look at it and categorize it. Three possible categories might be:
   a. bottles and cans
   b. food wrappers
   c. school work papers.
2. Develop an anti-litter campaign, for the classroom and school. Some possibilities for this might be;
   a. on a rotating basis have the different classes go outside and clean up the schoolyard.
   b. have an anti-litter poster contest.
   c. have the children decorate a large litter barrel.
   d. have a weekly used paper collection in each classroom. Some type of a graph can be made to show the efforts of each class.
   e. have the children write anti-litter slogans.

Evaluation:
Why do you think it is so important for us to keep our school ground clean? Would you like to have trash and litter all over your yard at home? What can we do to help keep our school clean?
HOW MIGHT WE ATTEMPT TO SOLVE OUR LITTER PROBLEM?

AFTER YOU ANALYZE THE COMPONENTS OF YOUR LITTER, YOU WILL HAVE SOME CLUES AS TO SOURCES AND HENCE SOME POINTS OF BEGINNING TO DEAL WITH THE PROBLEM

Solid Waste Activity

Paper Crisis

I. Introduction

This activity is to be an interdisciplinary effort in math, english, and science to foster an awareness of the unnecessary waste in paper and to interpret the impact on our environment. The results should direct the students to realize the necessity of being less wasteful and for recycling of paper when possible. The activity will be conducted by 8th grade students and will require 6 class periods spread over 2 months time.

II. Questions

1. Do you depend on paper products?
2. In what ways is paper used?
3. Do we need this much paper?
4. How could paper be conserved?
5. Where does paper come from?
6. Can it be recycled?
7. How much would recycling save?
8. Are there other advantages of recycling paper? What?

III. Materials - None

IV. Procedures:

1. In science class, compose questions relevant to calculating growth rate of trees, yield from trees into paper products, and cost factors of using pulp wood as opposed to used paper.
2. In English class, organize questions into a questionnaire which is to be sent to each of several paper companies.
3. In Math class, as a study of square area measure, begin a tally on all paper used, with total square surface vs. utilized surface to determine waste. GREAT!
4. From answers from paper company and exercise in step 3, compare the economic and environmental impact of our present situation and show how this impact will be altered by 1) being less wasteful of paper, 2) recycling of paper.
5. Demonstrate results of step 4 in graph form.

V. Follow-Up - This activity could lead into the initiation of a paper drive and or a paper conservation campaign. Could lead to expandion of interdisciplinary activities.

VI. Observe changes in paper use habits of students. Also enthusiasm toward having paper drive. Determine cooperation with other teachers.

A FINE ACTIVITY, BUT IT DOESN'T FOLLOW THE FORMAT.

Solid Waste Activity

I. Introduction

This transitional activity begins by allowing the students to become aware of the litter and solid waste problem in their community. Following data collection, processing, and evaluation, possible solutions to the problem will be discussed, and then all this information will be incorporated into a Super 8 movie.

II. Questions and activities

1. To lead to the activity
   a. Do the anybody's litter questionnaire. Have you ever littered? What made you litter? Why is there littering? Is it a problem? etc.
2. To initiate the activity
   a. What is the litter situation like in your community?
   b. In what part of the community is most of the litter located?
   c. What time of the day does most of this littering take place?
   d. Can we come up with more valid answers to these questions if we go out into the community?
   e. Is there a relationship between where litter is found and what type it is?

At this time, the students will be divided into groups and they will be sent out into the community to pick up trash and then record the necessary data (the type of litter and where it was found).

3. To continue the activity
   a. What type of litter did you find?
   b. Can you separate the trash into different categories?
   c. Are there enough litter baskets in the community?
   d. Can we as a class construct a scale model of the community, and then illustrate on this model the problems that we found in the actual community?
   e. What are some possible solutions to this community problem of litter?

THIS IS EXPANSION

4. To expand the activity
   a. Can we, as a class, suggest some possible solutions for eliminating (as much as possible) the problem areas in the community?
   b. Can we take all the information that we collected and all the suggestions that we talked about and make a movie?

At this time, the students would once again be broken down into groups; each group would be assigned to work on a particular aspect of the film. (writing the script, directing the movie, doing any art work, tape recording interviews, making the sound track, filming, editing, and splicing).

THIS IS PROBABLY ANOTHER WHOLE ACTIVITY

c. What groups in the community could we show this movie to in an attempt to gain support for getting these problems solved?

5. To evaluate the activity
   a. Does the movie express clearly our feelings and solutions concerning litter in the community?
   b. Did all the students take this project seriously and use their time wisely?
   c. Did any of the community groups who saw the movie respond with action in any form?
   d. Did we accomplish anything by making the film?
   e. DID THE LITTER SITUATION IMPROVE?

Equipment

1. Paper trash bags.
2. Field data recording equipment (clip board with graph paper)
3. Super 8 movie camera and film
4. Super 8 editing and splicing machine.

Bibliography

1. Unscenic Sight Census or Litter Bug Bugging
   Documentation Task Force
   Project KARE

Energy

Introduction

After having a lesson to trace the energy used to get an apple (or other food) from the blossom to your mouth.

Procedure

1. Lead to - The class will make a list of articles or products which are commonly used. Where do these items come from?
2. Initiate - How many of the items can be traced back to the sun? Have the class trace each item (one per child) from its finished usable state back to its origin.
3. Continue - Which other components of the environment are as important as soil? How? Are there any articles which you cannot trace back to the earth? Isn't there an indirect relationship to the soil?
4. Expand - Why is sun necessary for all life?
   WHAT IS DIFFERENT FROM THE "APPLE EXERCISE"?

PARTLY EVALUATION

COULD ITEMS BE INCLUDED TO GET ACROSS THE CONCEPT THAT SOME THINGS DO NOT RETURN TO THE SOIL? EVALUATION IS MISSING. THIS ACTIVITY IS LACKING IN "REAL WORLD" EXPERIENCE. IT IS SO BRIEF THAT IT IS OF LITTLE VALUE TO ANYONE BUT YOU.

"Energy Activity"

I. Introduction

This activity involves the student in awareness and transitional techniques concerning the use of electricity in the home. The student will first become aware of all the different ways that electricity is being used in his home, and then he will collect and analyze data in relation to how energy (electricity) can be conserved.

II. Questions and activities

1. To lead to the activity
   a. How is electricity produced?
   b. What do we use electricity for here at school?
   c. List as many things as you can that we use in the classroom which require electricity in order to operate.
   d. Is there much electricity being wasted at school?
   e. How can we help to conserve some of this wasted electricity?

2. To initiate the activity
   a. How does electricity get to your house?
   b. Where does it come from?
   c. Is there an unlimited supply of electricity available to the people of the earth?
   d. How could you find out how much electricity your family uses at home in one day?
   e. Home work assignment - List all the things in your home (lights, appliances, etc.) that use electricity.

3. To continue the activity
   a. Are all of the appliances used in your home absolutely necessary?
   b. If you could only keep 5 electrical appliances for your use, which ones would you choose?
   c. Take the list of appliances that you worked on (those used in your house) and put these into two categories: (1) necessary items and (2) luxury items.
   d. Which appliances that are used in your home now were not used in American homes 50 years ago?
   e. Which ones were used 100 years ago?

4. To expand the activity
   a. How is electricity wasted in your home?
   b. Is this wasting of electricity a major problem?
   c. What steps can you take to help conserve electricity in your home?
   d. How can we encourage other people in our environment to also conserve electricity?
   e. Who can we contact to get some information on how we can help to conserve electricity?

f. Class project - Prepare a booklet which will contain as many ways as possible that people can save or cut back on their consumption of electricity. Pass these books out to interested people in the community.

5. To evaluate the activity
   a. Did we do enough research?
   b. Are the methods that we listed to conserve electricity actually practical?
   c. Did we accomplish anything by passing out the booklet?

Equipment - No unusual equipment required - ditto masters are needed to produce the booklet.

WERE HOME AND/OR SCHOOL ELECTRIC BILLS ACTUALLY REDUCED?

GOOD

Energy Activity

I. Introduction

This activity is an off-shoot from the Astronomy unit dealing with our sun and stellar evolution. It allows for an expansion of the imagination and creativity around a hypothetical situation in which all basic life requirements must be supplied and maintained. The problem is: Man has been assigned the task of preparing for the day when our sun will expand to the red giant stage and no longer support earth's life. It is recommended but not required that a nuclear fusion reactor be utilized as the core of the life support system, and all other requirements be designed around the reactor. The project will be conducted by 8th grade students and will require 2 class periods plus one two weeks of home work to complete.

II. Questions

1. How long will our sun be able to support us?
2. Will technology be able to supply us with an alternative by that time?
3. Might we have to find an alternative before that time? Why?
4. What considerations must be made in order to design an alternative life support system?
5. How would you design such a system?

III. Materials: Poster boards, drafting materials, etc.

IV. Procedures:

1. Establish what life requirements are.)
2. Determine how they are met today.) Class Group Work
3. List established requirements and explain how they might be met in the life support system.
4. Design physical lay out of system and draw diagramatic model.
5. Display all systems and study variations in solutions from the following standpoints:
   1. effectiveness. 2. practicality. 3. ability to self sustain. 4. limitations. 5. degree of future technology required. 6. others as determined by students.
6. Piece together best solutions of various requirements into one system.

V. Follow-up or expansion

1. Mathmatical problems can be designed to determine size requirements, energy requirements - conservation of energy produced vs. that from sun.

2. Considerations of adapting solutions to current problems.
3. Discussion on what environmental conservations were utilized in new plan?

VI. Evaluation - This evaluation can be easily made thru observations of the wide range of solutions imagined by the students.

MANY ASPECTS OF THIS ARE HYPOTHETICAL. COULD MORE "REAL WORLD" EXPERIENCES BE INCLUDED?
ATTENTION TO FORMAT NEEDED.

Energy

Title: How we can use electricity in the home.

Introduction: This activity is designed to make students aware of the number of electrical appliances and conveniences used in their homes and to question to what degree these are needed.

To initiate ask:

a. Is there an energy shortage today?
b. What evidence is there of this?
c. Describe some of the major sources of energy?
d. What is energy?
e. About what part of the world's population does the United States have and how much of the world's energy supply do we consume?
f. Are there some ways that energy might be conserved by us?

Activity:

a. Have students list all the electrical appliances and uses of electricity in their homes. A GOOD HOMEWORK ASSIGNMENT.
b. Divide students into small groups and using their lists place the appliances into these groups: necessary, convenient, and better off without.
c. After groups have discussed these make up a summary on the blackboard and discuss as a class.

Expanding the activity:

a. Pass out to the class copies of the list of estimated power consumption of electric appliances so students can see which appliances use most of the electricity.
b. Ask: Is the amount of electricity used when the appliance is operating the only amount of energy we should be concerned with?
c. How many other ways is energy involved with making an electric toothbrush?

Evaluation:

a. Did students attempt to draw meaningful conclusions from their discussions?
b. How many appliances were listed as being in the home and how many were regarded as necessary, as compared to convenient and better off without?
c. Were any ideas brought up that might lead into other activities?

A GOOD ACTIVITY
FORMAT NEEDS ATTENTION.

Energy

Purpose: The purpose of this activity is to make the children aware of the different types of energy found in our classroom.

Lead-Up: If I said that I had lots of energy today, how do you think I would act? How would I act if I said I didn't have very much energy? What does energy help us to do?

Initiation: Now that we know that energy helps us to do our work, let's look carefully about our rooms. There are lots of things that use energy or need energy to work. What can you find?

Continuation: What electric things need energy? Do our plants need energy to grow? Does the water fountain use energy? Do you use more energy on some days rather than others? Do our gerbils use energy?

Expansion: What else in our school uses energy? Can you think of anything at home that uses energy that we don't have in our classroom?

Evaluation: Do you think it is important for us to spend our energy wisely? Why? How can we save energy in our class?

A GOOD ACTIVITY

Energy - Yesterday and Today

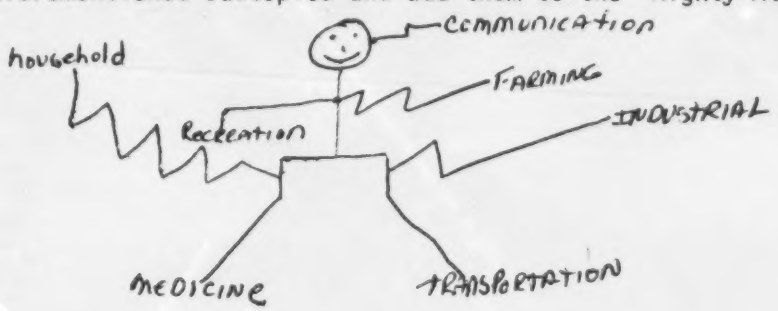
I. Introduction

This activity will allow the students to become aware of the conveniences electricity has provided in the 20th century and to go back 100-200 years and recall the energies that were involved to do the same task without electricity.

II. Procedure

1. As an introduction to this electricity activity the students could suggest different subtopics that could be explored under the general theme "Electricity." Examples of subtopics which could be suggested and investigated by the students would be:
   a. Communication and electricity.
   b. Farming and electricity.
   c. Industrial uses of electricity.
   d. Electrical household appliances.
   e. Recreation and electricity.
   f. Electricity and medicine.
   g. Musical instruments and electricity.

2. One group of students could use magazines, catalogues, etc. and collect pictures of modern electrical appliances relating to the aforementioned subtopics and add them to the "Mighty Atom."



3. The other groups of students could prepare pictures on large pieces of art paper showing how the same job was done 100-200 years ago. Example: Windmill to pump water rather than present day electric water pump.
4. The completed pictures could be placed on a bulletin board and titled "Ye Years of Olde."

Evaluation: Compare the two eras of history by asking the following questions:

1. What kinds of energy were required to operate the invention before electricity?
2. What modern day electrical appliances are large consumers of energy?
3. What kinds of energy are used to operate modern day appliances?
4. In terms of society and environment what impact (positive and negative) did each invention have?
5. Compare the two eras in dollar and cents value. What advantages and disadvantages are there to each era?

Have the family prepare a list of all the different ways electrical energy is used in their home. Rank the appliances from the most needed to the least needed. Also list all the appliances the family could do without.

Eliminate the useage of those appliances for one month as a family activity. Compare that month's electric bill with the previous month's bill.

HOW ABOUT AN ACTUAL CHECK ON THE AMOUNT USED IN THE HOME?

FORMAT NEEDS ATTENTION.

Food Chain

I. Introduction

The children are to take a nature walk to look for members of a food chain. They may take pictures to illustrate a large food-chain wheel for display.

II. Questions

1. To lead to the activity: What living things do you see in the pictures? Are there any living things that you can't see that would probably be living in the tree or in the ground?
2. To initiate the activity: Why do the living things need food? Where do they get their food? Is there a good cycle that exists between plants and animals in the picture?
3. To continue the activity: What living things are around our school? How could we find out? Where do you think these living things get their food? Do you think a food cycle exists between the plants and animals around our school?
4. To expand the activity: If one of the plants or animals was removed from the food cycle, what would happen? When a food cycle exists do you think there is balance in nature? Why? How do you think air and water pollution affect the food cycle? How does a forest fire affect the cycle?
5. To evaluate the activity: How can man help to maintain nature's balance? What is important about meat eaters, plant eaters, green plants and decomposers in a food chain?

III. Equipment

Paper, pencil and camera.

IV. Procedure

1. Show and discuss a picture illustration of the food chain.
2. Take the class on a nature walk to look for members of different food chains.
3. As they find these different members of the food chain, they may take pictures of them.
4. These photographs may be used to illustrate a large food chain wheel for display on a bulletin board, in the hall, etc.

"FOOD WEB" IS A BETTER TERM THAN "FOOD CHAIN".

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A GOOD ACTIVITY

Energy

I. Introduction

This activity is designed to allow the student to become aware that all life depends upon the interdependencies that exist among "all" living things and that man may affect other forms of life by his management or mismanagement of soil, plant life, and animal life. This activity is for fourth grade students. The activity should take one class period.

II. Questions

1. Lead to the activity:
   a. What does man depend upon to live?
   b. What does a plant need to live?
   c. What does a mouse need to live?
   d. Could man live without the soil?
   e. Could a rabbit live without plants?

2. To initiate activity ask:
   a. What are the essential things all life needs?
   b. Could we live if we only had water and no soil, sunlight, and air?
   c. Ask same questions using other essentials.

3. To continue activity:
   a. What do we call it where all things depend upon each other to live?
   b. Can you think of another name for the "Chain of Life"?

4. To expand activity ask:
   a. Could you think of other ways to demonstrate the "Web of Life"?

5. To evaluate activity ask.
   a. Can the student readily explain the dependency of all living things?
   b. Does the student know the essentials for life?
   c. Can the student identify other names for "Chain of Life"?
   d. Can the student demonstrate other ways to show the "Web of Life"?
   e. If man breaks the chain through careless management, what could happen?

III. Equipment

1. String; Signs for each child in class or every other child (work in groups of two).

IV. Procedure:

1. Make sure students can answer questions before demonstration
2. Play the Food Chain Game.
3. Some children may want to trade places and play again.
4. Allow extra time to give students a chance to devise their own method to demonstrate chain of life.

A GOOD ACTIVITY. WHY NOT ATTEMPT TO SET UP AN AQUARIUM FOOD WEB?

NOISE....

Noise Pollution

I. Introduction

This activity is designed to introduce noise pollution and variation in intensity to students. Different measuring techniques and more sophistication could be added when used by seventh graders. Students will be working in groups of three; a listener, a measurer and recorder, and one noise maker.

II. Questions

1. To lead into activity ask students:
   a. Do you always hear sound?
   b. What causes sound?
   c. Have you ever heard or thought of sound as pollution?
   d. Are there places or times when you might consider noise as pollution?
   e. What might be the noisiest place in the area?

2. To initiate the activity ask:
   a. How is sound measured today?
   b. Could you think of an alternative method of measuring sound without the use of costly equipment?
   c. Does the click of this ball point pen give you any ideas?

3. To continue the activity ask students:
   a. What environments could be checked in this area to find the quietest and noisiest areas?
   b. Could these be graphed to show results of data?

4. To evaluate the activity ask:
   a. Where were the lowest and highest noise levels observed?
   b. What were the main causes for both of these extremes?
   c. Could you make any suggestions as to how areas of high noise levels such as main streets could be made quieter?

III. Materials needed:

1. ball point pen or toy clickers.
2. note pads.
3. measuring devices.

IV. Procedure:

1. For measuring purposes, have students determine their average length of stride. Measurements can then be stepped off. Doing this is an activity in itself but it could be used for other activities:
   a. measure off a distance of 100 feet and have each student

step off this and count their steps. Divide this into 100 feet and find the length of each step.

2. One person is a clicker, one is a measurer, and the third sits and listens for the clicker while the clicker walks in a line away from the listener.
3. When the listener can no longer hear the clicks, the measurer steps off the distance traveled by the clicker and records the length.
4. Data collected could be compared by making up bar graphs comparing different areas and feet the click can be heard.

A GOOD ACTIVITY. WHAT TECHNIQUES COULD YOU USE TO EXPAND THE ACTIVITY?

Sound Activity
Quiet Time

I. Introduction

This activity is designed to provide an opportunity for the students to observe and absorb nature on his own, and attempt to develop a perspective purpose for all things on earth including himself. The activity is planned for 8th grade students at all levels and should be utilized at least one class period each month. The period would be split into 20 minutes for the quiet time and 20 minutes for recording experiences. It can be interdisciplinary in that English, Art, and Music will be utilized in expressing the experience.

II. Lead in:
Questions: What do you think about when you are alone? Have you ever been really alone?

Quote and Discuss: Self Awareness from the Profit by Kabil Fibran

Challenge students: Isolate themselves, meditate, and record experience.

III. Procedure:

1. 1st session - Assign class to be aware of all questions that cross their minds during the quiet time. Record questions only (no answers) these will be compiled, compared and discussed and used as starting points for students in subsequent quiet times.
2. Subsequent sessions: Students are to report their thoughts and experiences in form of their choice - written form, art, a song, etc.
3. Compile and share experiences.

IV. Limitations - Available time, students interest span, the activity will have to be adjusted to match students ability to handle it. Distractions - students should find a location with a minimal amount of distraction.

V. Follow-Up - Sharing of experiences could lead into: 1. more advanced self awareness counseling sessions. 2. an art show. 3. a publication of songs, poems, etc.

VI. Evaluation - The degree of student participation and an analysis of the students accounts of their experiences would be indicative of this activity's effectiveness. A change in attitudes should also be obvious in some students.

GOOD
FORMAT NEEDS ATTENTION.

Noise Pollution

I. Introduction

This activity will allow the students to become aware of the different sources of noise pollution and to turn this awareness into a tape recording experience. A noisy moment near your classroom, such as a lawnmower, would be a good time to undertake this activity.

II. Questions

1. To lead to the activity:
   a. What is noise?
   b. What different kinds of noises did you hear on your way to school this morning?

2. To initiate the activity ask:
   a. How do you measure the intensity of noise?
   b. What are the noise levels of:
      1. Airplane engine?
      2. Riveting machine?
      3. Pneumatic drill?
      4. Train?
      5. Traffic?
      6. Conversation?
      7. Whisper?
   c. What can we do to lessen noise?
      1. What can be done to make a car run quieter?
      2. What do we do to make a room quieter?
      3. What has been done in our classroom to make it quieter?

3. To continue the activity?
   a. How can noises around the school be ranked according to different noise levels?

4. To expand the activity ask:
   a. How could this activity be helpful in detecting and determining the noise levels at different locations around the school?

5. To evaluate the activity ask:
   a. Was the tape recorded at the different locations ranked from the quietest to loudest sound?
   b. Which of the locations were the quietest?
   c. Which of the locations were the noisiest?
   d. What were the sources of noise pollution at the different locations?
   e. Did the tape include both natural and manmade noises?

III. Equipment

Tape recorder, the environment, students, paper, pencil, straight edge, tape measure, table or desk.

IV. Procedure

1. Have the students prepare a list of all sounds they hear in the classroom.
2. Have the students experience the "Quiet Time" activity for 20 minutes outside the classroom.
3. Have the students work through the Plane Table Mapping Activity. Place the students into small groups and assign each group to a specific area on the school property.
4. After the students complete their maps have them locate specific places on the map where they would like to do different noise level samplings.
5. Record the noise levels on a tape at the different locations.
6. Replay the tape in a quiet place and have the students rank the different locations from quietest to noisiest. They could rank the different noise levels by using a number system.

A PROBLEM YOU MAY FIND WITH THE RECORDING. MANY RECORDERS WILL AUTOMATICALLY ADJUST THE SOUND BEING RECORDED TO A STANDARD LEVEL, SOFT SOUNDS AMPLIFIED LOUDER ONES DEPRESSED: YOUR SECONDARY READINGS MAY BE ACCORDINGLY INACCURATE.

Noise

Introduction

Once we have established a standard sound for our noise level we are able to start the activity. We will be taking noise readings.

Procedure

Lead Into - What is noise? How loud is loud?

Initiate - What method can we use to measure noise? Start to take readings by having a child walking away from a sound and stopping when he no longer hears it. Record the data. (If the children have come up with a different method, try it).

Continue - What happens in areas where the noise is not constant? How else could we measure the noise?

Expand - How can we measure the noise when it is not constant? In an area with a high noise level what can we do to lessen it? Can anything be done?

Evaluation - Do the children realize the individual differences in hearing when different children are used in the experiment? Could the children give a definition and examples of noise pollution? Could the children devise another method to measure sound intensity? Or could they refine their testing method after the experiment?

ONCE METHODS TO LESSEN NOISE HAVE BEEN IDENTIFIED CAN THEY ACTUALLY IMPLEMENT THEM? BARRIER PLANTINGS, DEFLECTORS, A CLASSROOM "QUIET BOX" MADE OF EGG CARTONS, ETC.

Noise - Quiet Time and Measuring Noise Pollution

I. Introduction

This activity is designed to allow the student to become aware of noise pollution through the use of a quiet time and measuring the noise of different areas. This activity is to be used for fourth grade students. The time allotted will be two class periods.

II. Questions

1. Lead to the activity:
   a. What is noise pollution?
   b. How could we best become aware of noise pollution?
   c. What things do you feel add to noise pollution?

2. To initiate activity:
   a. What are things inside the school which cause noise pollution? (outside?)
   b. If you have a favorite place to go to think where is it and why do you go there?
   c. Did you ever notice that any place you go to, where you think it is quiet, there is always some noise?

3. To continue activity:
   a. How can we measure the noise at different places?
   b. If we measure noise pollution what must we consider?

4. To expand activity ask:
   a. If we find a place which is very noisy what could we do to stop it or lower the noise?
   b. Do factories do anything about the intensity of noise?

5. To evaluate activity:
   a. Did students give a sensible definition for noise pollution?
   b. Do students know causes of noise pollution?
   c. Do they know why they feel their things are noise pollutants?
   d. Could the students come up with some ways to measure noise pollution?
   e. Could the students come up with any solutions to lessen noise pollution?
   f. Did students know any methods used by factories to lessen noise pollution?

III. Equipment

1. 50 to 100' tape measure
2. object used by students to make constant noise.
3. Paper and pencil
4. Different noise areas
5. students.

IV. Procedure:

1. Have students do a quiet time. They should list all the things they see, hear, and smell. Making special note of things heard (15 minutes).
2. Use noise data found through quiet time to help them decide areas to be measured to compare noise levels.
3. Use a constant noise and tape measure to record noise distances.
4. This should enable students to draw conclusions about noise levels of different areas.
5. If places are found too noisy allow students to come up with solutions to problems.

COULD A NEXT STEP INVOLVE STUDENTS IN IMPLEMENTING THOSE SOLUTIONS (MEET WITH COMMUNITY LEADERS, BUILD A NOISE BARRIER WALL, CONSTRUCT A QUIET BOX OUT OF EGG CARTONS, ETC.)

Noise

Purpose: The purpose of this activity is to make the children aware of their sense of hearing, and to make them aware of the variety of sounds found in their environment.

Lead-Up: Begin talking to the children, but without speaking out loud. Wait a few minutes to get reactions.

Initiation: Why didn't anyone get in line like I asked? (they couldn't hear). How do you think you would like it if you didn't have ears and you couldn't hear me or anyone else?

Continuation: Let's listen carefully in our classroom. We can list everything we hear. What can you hear around the door? the windows? the discovery table? the study booth ? the game center? the art center?

Expansion: Take children to different areas in and out of the school. List different noises that are heard. Children can decide if certain sounds are heard only in one place or in several places.

Have children help make lists of noises that are heard in different rooms at home. Can compare these to sounds heard at school.

Make a tape recording of different sounds. See if children can identify them.

Evaluation: How important do you think our ears are? What noises do you like to hear? What noises don't you like to hear? Are some noises louder than others?

FINE

"Noise Activity"

I. Introduction

The intent of this activity is to allow the children to become aware of noises as a pollution factor within the environment, and to guide the students in doing experiments related to the effect that noise can have or does have on the growth of living things (plants specifically).

II. Questions and Activities

1. To lead to the activity:
   a. What are some of the noises that you can hear right now in the classroom?
   b. Which of these noises are pleasant for you to hear?
   c. Which of these noises are unpleasant for you to hear?
   d. Can you trace the path of these noises starting from your ear all the way back to the origin of the object that is producing the sound.
   e. Is any of these sounds that you hear actually irritating you in any way?

2. To initiate the activity:
   a. Would you consider the community that you live in to be a quiet one or a noisy one?
   b. What parts of the community are the noisiest?
   c. What parts of the community are the quietest?
   d. Is there any possible way of bringing the noise of the community back into the classroom?
   e. Activity - Divide the children into groups, then assign each group to record on tape the sounds which are common to a particular area of the community.

3. To continue the activity:
   a. Play back the tapes for the entire class, and have a discussion concerning the sounds.
   b. Are there any sounds that you heard on the tape that you did not hear when you were actually there at the spot?
   c. Do you think that these noises have any affect on living things?
   d. From listening to the tapes, which area in the community would you predict to be the most conducive to healthy plant growth?
   e. How could you test out your ideas on the relationship between noise, noise pollution, and plant growth?
   f. Assignment - each student or small groups of students should devise and carry out an experiment relating noise and plant growth.
   g. Possible area of investigation - scatter plants throughout the community, placing them in the quiet and noisy places established by the analysis of the noise recordings.

4. To expand the activity:
   a. What are your conclusions concerning the relationship between noise pollution and plant growth?
   b. Do you think anyone else would be interested in hearing your results?
   c. The conclusions of the students (along with collected data) could be dittoed and put into the form of a booklet. Some people in the community may be interested in reading these booklets.
   d. Plane table mapping could be used to show the locations of the sources of noise pollution within the community.

5. To evaluate the activity:
   a. Did the students establish controls for their experiments (valid controls).
   b. How accurate are the conclusions to the student?
   c. Did you learn anything by doing this activity?
   d. Are you now more aware of noise pollution than you were before you started working on these activities?

Equipment: Tape recorders, plants (seed and soil), ditto masters, tables, tape measure and pencils.

ANY NOISE EFFECTS ON PLANTS WOULD BE CONTROVERSIAL AT BEST. CONTROL WOULD BE EXTREMELY DIFFICULT AND POSSIBLE ONLY UNDER TOTALLY ARTIFICIAL CONDITIONS. THE LEARNING WOULD MOST LIKELY BE TECHNIQUES INVOLVED IN EXPERIMENTATION AND DATA COLLECTION RATHER THAN PARTICULAR PLANT RESPONSES.

Taping Sound

I. Introduction

The children will become more aware of noise in their environment by listening to certain records and by making their own tapes of sounds of their environment.

II. Questions

1. To lead to the activity: What are the noises you hear on this record? Where do you hear noises like these? What kinds of noises are these?

2. To initiate the activity: What noises do you hear each day? What kinds of noises are these (loud, soft, pleasant, unpleasant)? Where do you hear these noises?

3. To continue the activity: Do you think you could record some of these noises ona tape recorder? Where could you go to record these noises? What other kinds of noises could you record?

4. To expand the activity: Could someone else guess what noises you have recorded? Do you think you could record different kinds of noises at other spots? Where else would you like to record?

5. To evaluate the activity: Do you enjoy listening to any of the noises that have been recorded? Which ones? Why? Which noises don't you enjoy listening to? Why?

III. Equipment

1. Record (Noise or sound effects record or environments records) and record player.
2. Tape recorder and tapes.

IV. Procedure

1. Play different records for the children to listen to and have them guess what the noises or sounds are.
2. Next discuss the different noises the children heard on the records and the different noises they hear in their own environment.
3. Then divide into groups and give each group a tape recorder. They can then make their own tape of different noises or sounds they hear in their own environment. The children could be restricted to certain areas or be given a free choice.
4. They may then play their tapes for each other and try to guess what the noises are and where they could have been recorded.

97

A GOOD ACTIVITY

POPULATION....

Population: The Quadrat Technique

I. Introduction

This activity is designed to allow the student to become more aware of the population of different areas of land (lawn, field, wet area, and forest) through a quadrat study of each area. This activity is to be used with fourth grade students. The activity will take two class periods.

II. Questions

1. To lead to the activity:
   a. How would you define "population"?
   b. What would make the population of a given area decrease? increase?
   c. What other things may affect the population of an area?

2. To initiate the activity ask:
   a. What would you do to find the population of our school? community?
   b. What made your mother and father live here?
   c. If we wanted to find out why certain animals and plants populate different areas what would we have to consider (just like your mom and dad)?
   d. What would be different about the population of plants and animals in a dry area compared with a wet area? (compare forest, field, and lawm areas)

3. To continue activity:
   a. How could we effectively record populations of each of the areas we study?
   b. What must we consider in choosing the sites we study?

4. To expand activity:
   a. In areas where low population was evident what was the cause?
   b. If man contributed to the cause how might we help these areas?
   c. If a high population was restricting any of the areas what was the cause? Could we help these areas?
   d. Does man use population controls? If so what are they? Are they effective? Why does man do this?

5. To evaluate the activity:
   a. Did students know a reasonable definition for "population"?
   b. Did students know what affects population?
   c. Did students know why some areas would be highly populated and others not?
   d. Could students use their knowledge of "population" in the quadrat studies of their areas?

e. Could students come up with any solutions to population problems in their given areas?
f. Did students have any knowledge of the "why's", "what's" and "where's" of population controls?

III. Equipment

1. Some object to mark off areas to be studies - coat hangers.
2. Pencil and paper to keep records.
3. Jars to place specimens in to do count - macroorganisms
4. Students.

IV. Procedure:

1. Make sure students have knowledgable ideas about population.
2. Make charts to keep records of counts.
3. Eyeball each over-all area studies.
4. Do quadrat studies.
5. Use information to do comparisons of each and to form conclusions.
6. Allow students to formulate solutions to problems. If solutions are fisible try to solve some of the problems for independent study.

A GOOD ACTIVITY

"Population Exercise"

I. Introduction

This activity is designed to make the student aware of what is involved in estimating the population of a certain animal living in a particular area.

1. To lead to the activity:
   a. What does the word, population, mean?
   b. Does the word, "population", apply only to people?
   c. How is the human population of the United States determined?
   d. What is overpopulation?
   e. Can a particular kind of animal overpopulate an area?

2. To initiate the activity:
   a. Introduce the Petersen Population Estimation Formula to the students by working through the bean exercise. To work through this bean exercise, divide the students into small groups of 4-5 students per group. Make sure each group has at least one good math student.
   b. Analyzing statistics - Can you see any relationships between P, M, U, and R.
   c. Can this population estimation formula be applied to the "real world"?
   d. What kind of animal populations could we estimate around the area of the school?

3. To continue the exercise:
   a. How could you estimate the population of crayfish of the local stream?
   b. Take the students down to the local stream to do a precensus on the cray fish population of the stream. The cray fish captured in the precensus could be marked by dabbing a splotch of paint on the top of the cray fish's shell.
   c. Approximately two weeks later, once again travel to the stream to do the post census.
   d. Go back to the classroom to crank out the mathematics of the problem.
   e. Were you able to count every single crayfish in the stream?

4. To expand the activity:
   a. How is this population estimation useful to us?
   b. Assignment - For each group of students - make an attempt to estimate the feral dog population within the community. Encourage students to borrow cameras (if they don't have one) for this assignment.
   c. Are feral dogs a problem in the community?

5. To evaluate the activity:
   a. Do most of the students understand how to work out the formula?
   b. Did the students exhibit enthusiasm as they worked on the activity?
   c. Ask the students if they felt that this assignment was important?
   d. What did you learn by doing this activity?

Equipment - Beans and magic markers, containers, paint brushes and paint, cameras, note books and pencils.

A GOOD ACTIVITY. YOU MAY HAVE DIFFICULTY PAINTING THE CRAYFISH. CUTTING SMALL NOTCHES IN THEIR TAILS MAY BE EASIER.

Population Study

I. Introduction

This activity will enable the students to become aware of the population of plants that live in different areas and to construct a graph showing the different number of plants for a given area.

II. Questions

1. To lead to the activity:
   a. What is a population study?
   b. What different kinds of population studies can be made?

2. To initiate the activity ask:
   a. What kind of information do population studies provide for man?
   b. What kinds of population studies could be made around the school?

3. To continue the activity ask:
   a. From what different kinds of areas could a plant population study be made.

4. To expand the activity ask:
   a. How could this activity be used to show plant population differences for various areas?

5. To evaluate the activity ask:
   a. Which plants dominate each of the areas?
   b. Which plants are least dominant in each area?
   c. Which have the most plant life?
   d. Which areas have the least plant life?
   e. Why was the plant pollution greater in some areas and lesser in others.
   f. How do the plants differ in size, color, shape, and arrangement in the different areas?
   g. Which areas have the greatest and least diversity of plants?

III. Equipment

1. Different areas of plant study.
2. Graph paper
3. Square foot enclosure

IV. Procedure

1. Have students locate different habitats where plant population studies could be made. This can be done as a class activity. Possibilities of areas to study would be: Wooded area, Open field, Meadowland, Marsh or swampland, and Lawn.

2. Have the students work in five different groups - one group to sample each area.
3. Each group will use the foot square measurement to find the total number of plants that exist in each location.
4. The students can find the diversity of plants for each location.
5. Have the students prepare a bar and line graph showing the population and diversities of plant for each of the five areas.
6. The students could expand the activity by finding the number of plants for a square yard or an acre for each of the five areas.

A GOOD ACTIVITY

Population Studies Activity

I. Introduction

Students are often concerned about how population counts are made. Often this comes up when we have the Hunter Safety program. They may question how the deer, rabbit, or mourning dove populations are determined especially as these are game animals. This activity, demonstrating the Petersen Population Estimation Formula is used to show how populations may be found when it is impossible to count all individuals involved.

II. Questions

1. To lead into the activity:
   a. What is a population?
   b. In what situations might an estimated population be used?
   c. Can you think of some problems in making a population count of certain species?

2. To initiate the activity ask students:
   a. Do you think it is possible to estimate the number of dried beans in this bag?
   b. Is it possible to get the number exact?

3. To continue this activity:
   a. If the number of beans in the bag can be estimated, could organisms in the wild be estimated using a similiar technique?

4. To evaluate:
   a. How could other populations be counted using this technique?
   b. Is this process accurate enough to make good estimates in other situations?

III. Equipment:

1. A one-pound bag of beans
2. A large tray, and a large bottle or bowl.
3. Spray paint to color beans.
4. Recording pad.

IV. Procedure:

1. Have students divide up into groups of three and provide each with a large tray, one bag of beans, 150 painted beans, a large jar and a summary chart.
2. Complete the 15 steps and fill in chart and record results.

3. When complete, count all the beans in the bag and compare to estimates.
4. Students might want to average out the 15 estimates and compare the average to the total number of beans.
5. Buy ice cream cones for the group that comes closest to the actual number of beans.
6. Have groups discuss their results and see if study was accurate.
7. Collect beans and equipment and keep for later use.

EXPANSION TECHNIQUES?

Population Activity

I. Introduction

This activity is a supplement to Land Use Capability Studies. It involves taking Quantrat samples from each of several different land use capability classes, both in proper use and in improper use. Overall diversity as well as quantitative and qualitative data will be collected for both plant and animal life. 8th grade students of the transitional and operational levels will participate in the activity, which will require 3 hours/Quadrat.

II. Questions

1. Do soil conditions effect an areas ability to support life?
2. Do the types of living things change with a change in conditions?
3. How might the measure of land effect the life found in any specific area?
4. Can your answers above be statistically supported? How?

III. Preparation

1. Determine where samples will be taken in order to represent various conditions.
2. Describe procedures for:
   a. taking Quadrat samples - use hula hoop as standard for plants and clothes hanger for animal standard.
   b. Formula for calculating diversity index.
   c. Use of field guides for plants and insects.
   d. Use of screens for collection of soil insects.
   e. Plant and insect collection, preservation, and labeling procedures.

IV. Equipment: Hula Hoop, clothes hanger, insect and plant field guides, spoons and trowels, #10 cans, screen, formaldehyde or alcohol, baby food jars.

V. Procedure:

1. Place quadrats standard in area to be studied by a random method.
2. Take representative sample of each plant type within standard area to be pressed - count number of specimens for each type found.
3. Collect samples of each animal type on surface within standard area - preserve - count each type
4. Dig to depth of one foot inside standard area and place in a can to be taken into the lab.

5. Run collected soil thru screening to collect soil insects - preserve - count # of each type.
6. Identify plant and animal type collected, prepare displays of all specimens and indicate conditions of area in which found and #'s of each type - use for comparisons.
7. Calculate Diversity Index.
8. Analyze all data.

VI. Follow Up

1. Calculation of Diversity Index could be applied to other studies such as for fresh water macroinvertibratess
2. Collection of animal species could be expanded to utilize the Petersen formula in more specific population studies.
3. Plant and animal preserving techniques could lead into the preparation of a more complete plant and animal reference collection.
4. Data could be started to initiate a data bank on such studies in the community.

VII. Evaluation: Evaluation can be made by several critera:

1. Competency developed in identification of plant and animal species.
2. Degree to which collected data is consistant in the predicted results.
3. Studies comprehension of data analysis.
4. Student initiative in expanded studies.

A GOOD ACTIVITY. IT WILL FILL THE THREE HOURS.

Population

Purpose: The purpose of this activity is to help make the children aware of the variety of populations in each of their homes.

Lead Up: Do you think that every mother dog has the same number of puppies as every other mother dog? Does our mother gerbil have the same number of babies each time she has them? Do you think we all have the same number of people in our homes?

Initiation: I want everyone to think of their homes and all the people who live in them. Think about your mother and father and your sisters and brothers. You might also have a grandmother or grandfather at your home.

Continuation: (Construct a graph on board - record information as it is given). Do you live at home? How many children are there at home? How many grown-ups are there at home?

Expansion: How many grown up men are there at home?
How many grown up women are there at home?
How many sisters do you have?
How many brothers do you have?
How many children are at home that are younger than you?
How many children are at home that are older than you are?
Can do the same things with pet analysis.

Evaluation: Do we all have the same number of grown-ups at home? How about children? Do we all have the same pets?

GOOD. SMALL AQUATIC ORGANISMS COULD BE USED TO ESTABLISH SOME POPULATIONS IN THE CLASSROOM. COMPARE RESULTS WITH NATIONAL STATISTICS.

Population

Introduction

I would use this activity after the class has had many experiences sampling for awareness, numbers, and diversity. I would also have done the Petersen Population Estimation Formula activity with beans.

Procedure

Lead Into - Can we get a precise population count of a species? If so how? What are the difficulties in doing it?

Initiatory - What are some of the methods we have used to take samples? We are going to try to estimate the population number of grasses on our school grounds. Half of the class will use random quadrat sampling and the other will use transect sampling. We will use an area of a 6 inch square.

Continue - Record data and keep samples for display and analyzing. Were there any difficulties in taking these samples?

Expand - When they come back to the class they have much computation to do. If we have found out before hand the area of the school grounds and the school building, we're ready to multiply the number found in the sample.(?)

Evaluate - Would you change the method used to do something like this? Could they appreciate the difficulty in counting such a large (NUMEROUS?) species? Do they now understand the benefits of an estimating formula?

I could do this same activity with macro-organisms instead of plants.

HOW WILL YOU RELATE THIS TO OTHER POPULATIONS? COULD YOU ESTABLISH SOME CLASSROOM POPULATIONS TO DEAL WITH ALSO?

Population

Map Study

I. Introduction

The children will compare a population map of the United States with a pollution (water or air) map of the United States. This is to help make them more aware of where pollution problems are and of how population and pollution are related.

II. Questions

1. To lead into the activity: What do maps tell you? Are there different maps that tell you different things?

2. To initiate the activity: What different kinds of things can maps tell you? What does a population map tell you? Have you ever heard of a pollution map? What do you think it tells you?

3. To continue the activity: Could you compare two maps to find out certain things? How could you compare a population map with a pollution map?

4. To expand the activity: How could you find out how the population compares with the pollution in your area? Could you make your own maps of the area?

III. Equipment:

1. Population Map of U.S.
2. Pollution Map of U.S.

IV. Procedure:

1. Study the population map and note the dense areas.
2. Study the pollution map and note the most polluted areas.
3. Compare the two maps and see how the dense population areas are related to the most polluted areas. Discuss the comparison.
4. The children may want to pick out one city or area to study in relation to population and pollution.
5. The child may want to make maps of his own dealing with the community in which he lives, the school, a small area of ground, etc. These maps could be both population and pollution of any kind.

EVALUATION?

Transportation

Purpose: The purpose of this activity is to help make the children aware of the many different modes and uses of transportation.

Lead-Up: Have a display table or bulletin board with pictures of many different transportation vehicles that the children can look at.

Initiation: How many of you took a boat to school today? Why not? Did you take a train? Why not?

Continuation: How many took the bus? How many walked? Did anyone take a taxi? How about a trailer? Did anyone come in a camper?

Expansion: List different modes of transportation on board. Discuss each one and its use. Could also take a survey to see how many cars, bikes, etc. at each home.

Evaluation: Why don't you think your dad would want to buy a school bus to drive around? Do you think it would be a good idea if the school used taxi cabs instead of buses? Could you take a train across the ocean?

THIS IS ONLY DISCUSSION. WHAT COULD THE STUDENTS DO RELATIVE TO THIS TOPIC?

Transportation Activity

I. Introduction

This activity is designed to provide the students with statistical data as evidence of energy waste in transportation, and to encourage them to develop alternative travel habits in order to save energy. Skills in math, map reading, and budgeting of time and money will be called for in this activity. It is planned for 8th grade students. Time requirements will be one week out of class work for collecting data, and 4 class periods for analysis. The practice should be a continuing one.

II. Questions

1. How did you get to school today?
2. How much energy did it require?
3. Who came with you?
4. Why was so much energy required?
5. How could energy be saved?
6. What statistics could we compile to prove your answers?

III. Procedure

1. Data Collection: Each student will keep a log for one week for each mode of travel in his family. Such information to be recorded would be:
   a. weight of vehicle.
   b. miles traveled per week
   c. fuel used per week
   d. miles/gallon
   e. cost of fuel
   f. cost per week
   g. for each trip taken
   h. destination and purpose
   i. distance (plot on map)
   j. number of passengers.
2. Analysis of data:
   a. Calculate total cost per person and excess weight transported, etc.
   b. Categorize each trip as to how essential it was and look for alternative such as combining trips, car pool, walk, use bus, bicycle, use other car, eliminate trip, etc.
   c. Recalculate costs using alternatives selected and compute savings.
3. Application - List possible activities planned for following week and plan a travel budget to be tried. Encourage continuation of practice.

IV. Follow-Up:

This activity could lead into studies in air pollution, urban planning, and economics of car selection, man transit, etc.

V. Evaluation

The effectiveness of this activity can be determined by the students' reactions to the savings obtained in the study week, the practicability of the alternative, and the degree to which students utilize the budgeting techniques as a continuing practice.

GOOD
FORMAT NEEDS ATTENTION.

Transportation

Introduction

I would use this activity as a transition from studying air pollution to transportation and its effects on the environment.

Procedure

Lead Into - Can you think of a way to collect particulates from car emissions? What variables need to remain constant in all samplings?

Initiate - Make vaseline covered paper samplers. What results do you expect to find?

Continue - Take the samples for a certain length of time, a certain distance, and with the car at idle. Keep a record of all of this. Use a qualitative method to compare.

Expand - I would expand this activity by setting up a time and date that the children's parents may come to have their cars checked. We would have a simple questionnaire for the participants to fill out. For example - type of car, engine size, date of last tune up, distance they drove to get to school. While they are filling this out, the children could be taking a vaseline-paper sample. Then we would attach a piece of gauze over the tail pipe and attach with a rubber band. They would drive around the circle where this sample will be collected. They will be able to put the three pieces of data together and make a qualitative judgment comparing with samples we had before.

I could further expand this by having them count the number of particulates in a square inch to get a quantitative scale.

A GOOD ACTIVITY - WHAT ABOUT EVALUATION?

Types of Transportation

I. Introduction

The children will find out the different types of transportation available to them in the community. They will find certain data on each to help them become more aware of services available to them.

II. Questions

1. To lead to the activity:
   How can you get from one place to another place in your community? Do you always travel the same way? Do you know anyone that travels another way?

2. To initiate the activity:
   Why do people use different types of transportation? What types of transportation have you used? Why?

3. To continue the activity:
   What do you know about the different kinds of transportation we have talked about? What other things would you like to know about them? How can we find out more about them?

4. To expand the activity:
   Do other towns or cities in the area have the same kind of transportation yours does? How are theirs the same or different?

5. To evaluate the activity:
   Would you like to use any of the transportation means we have learned about that you never used before? Why?

III. Equipment - None

IV. Procedure

1. The class will discuss the types of transportation available to them.
2. They will find ways to collect information on each type of transportation. To do this they might form groups and have each group study a type of transportation.
3. The information they collect might have to do with cost, area services, convenience to customers, etc. The information collected would then be shared and compared.
4. The class might choose to take a trip using one form of transportation that they learned about (ex.: train).

WITH THE EXCEPTION OF #4, THIS IS LACKING IN "REAL-WORLD" EXPERIENCE.

Transportation - Air Pollution Test on Vehicles

I. Introduction

This activity is designed to allow the student to become aware of the varying amounts of particulants which are emitted by car exhaust. It will allow students to draw conclusions about why this happens more with one car and not another. This activity is for fourth grade students. It will be conducted in one class period.

II. Questions

1. To lead into the activity:
   a. What are some causes of air pollution?
   b. What are the things found in car exhaust which add to the pollution of the air?

2. To initiate activity ask:
   a. Of the pollutants found in car exhaust which do you think are the more polluting? (less polluting)?

3. To continue activity:
   a. What are some of the things we must consider when we are surveying a car for pollutants?
   b. How could we best find the answers to the things we must know about a car before we test it?
   c. How would we set up a method or scale to show a range from high to low pollutants?

4. To expand activity:
   a. Are automobile manufacturers doing anything to help eliminate the pollutants put forth in car exhausts?
   b. If we find a car which is polluting is there anything we could do?

5. To evaluate activity:
   a. Did student know causes of air pollution? Did they think of automobiles?
   b. What types of traveled areas would raise the scale of air pollution? Why?
   c. Can the students identify the things collected on the samples as highly or less polluting the air? As compared with all the substances that come out of exhausts?
   d. Could they draw conclusions as to why one car emits more pollutants than others?
   e. Did they know anything about anti-pollution devices placed on cars?
   f. Could they come up with solutions to any individual problem.

III. Equipment

1. Paper and pencil for data.
2. Questionnarie
3. Gauze and white paper.
4. Vaseline
5. Rubberbands
6. Saran wrap
7. Construction Paper
8. Box to store findings
9. Stapler
10. Table at site.

IV. Procedure

1. Run a survey on how many parents would like cars tested.
2. Run test:
   a. Fill in questionnaire - must be composed by students.
   b. Using white paper and vaseline, run test on cars standing still.
   c. Using gauze with vaseline rubberband to exhaust pipe, conduct test on moving car.
   d. Cover both tests with Saran wrap and staple to paper.
   e. Staple these to questionnaire.
   f. Use test data to draw conclusions.

A GOOD ACTIVITY. THE STUDENTS MAY HAVE DIFFICULTY ANSWERING QUESTION 2a.

"Transportation Activity"

I. Introduction

This activity is designed to provide the students with an opportunity to collect data and store this information in a data bank. Another important aspect of the activity is the interaction that will take place between the students and the people of the community.

1. To lead into the activity:
   a. Do automobiles contribute a lot to air pollution?
   b. What are the different kinds of pollution caused by cars?
   c. Is there such a thing as pollution that you cannot see?

2. To initiate the activity:
   a. Do some cars create more pollution than others?
   b. Can you think of any method that we could use to test different cars to see which ones emit the most particulates?
   c. Activity - Illustrate the method of sampling particulate emissions from an automobile using vaseline smeared paper.
   d. Can we test the cars of the community using this method?

3. To continue the activity:
   a. What kind of a system could we use to test these cars?
   b. Are there any questions that you would like to ask the driver or owner of each car tested?
   c. What information would be useful to know about each car?
   d. Can you put these questions into the form of a questionnaire?
   e. Advertise in the community - "Have your car tested for particulate emission - Free of charge. Come to the school on such and such a date - between the hours of_____"
   f. Have the students fill out a questionnaire on each driver during the testing of the car.

4. To expand the activity:
   a. Can you organize all the information collected and establish a data bank concerning particulate emissions from autos?
   b. Can you come to any conclusions from analyzing the data collected?
   c. Do cars that have been tuned up recently seem to emit a lesser amount of particulates than cars which have not been tuned up recently?
   d. Are there any recommendations that you can make to people who have cars that emit a lot of particulate matter?

5. To evaluate the activity:
   a. Did most of the students take an active part in the activity?

b. Did the students maintain the same controls for each car tested?
c. Did the students draw valid conclusions from the tested data?

Equipment: paper, cardboard, vaseline, notebooks and pencils, Saran wrap

A GOOD ACTIVITY

Transportation Survey

I. Introduction

This activity is designed to allow the students to become aware of different modes of transportation and in turn to do a study on traffic flow to find the times of least and heaviest traffic flow for a week day.

II. Questions

1. To lead to the activity:
   a. What is transportation?
   b. What different modes of transportation could be used to travel from our community to Chicago?

2. To initiate the activity ask:
   a. What modes of transportation are commonly seen on the streets and highways in our community?
   b. What different modes of transportation have you experienced in the past?
   c. What modes of transportation would you like to experience that you haven't experienced in the past?

3. To continue the activity ask:
   a. What role has transportation played in the development of the United States?
   b. What are some different types of
      1. Private vehicles?
      2. Commercial vehicles?
      3. Public transportation vehicles?

4. To expand the activity ask:
   a. What types of services are provided through our transportation system?
   b. What kinds of merchandise are transported from one area to another in the United States?
   c. How could this activity be used to determine the lightest and heaviest flow of traffic in our community?

5. Evaluation
   a. How many different kinds of vehicles--including private, commercial and public--have you been able to clarify(?)
   b. What hour(s) of the weekday have had the greatest flow of traffic?
   c. What hour(s) had the least flow of traffic?
   d. What was the ratio of foreign cars to American cars?
   e. What was the ratio of full-size cars to compact cars?
   f. What was the average number of passengers per car during the weekday?
   g. What was the total number of all vehicles counted for one weekday?

III. Equipment

1. Data sheets for recording information
2. Clock or watch
3. Groups of students

IV. Procedure

1. Divide the students into three equal groups. Group #1 will keep record of the private vehicles. Group #2 will keep a record of commercial vehicles. Group #3 will keep a record of public transportation vehicles.
2. Each student within the group will be responsible for keeping a record of one specific vehicle and to record the data.
3. In addition to keeping inventory the student will provide the following information in his survey.
   a. Place
   b. Date
   c. Day of week
   d. Direction of traffic flow by using the following symbols
      East West North South
   e. Time
   f. Number of lanes
   g. Weather
4. As a visual tool each group of students could be equipped with a set of photographs depicting different vehicles. The groups could use these pictures as references in completing their survey.
5. The students may wish to expand this activity by doing additional surveys on secondary roads, rural areas, etc.
6. The students could construct graphs by different groups, showing the traffic flow of different vehicles at various intervals of the weekday.

GOOD

Collection of Particulate Matter from Automobile Exhaust

I. Introduction

This activity provides students with the opportunity to check particulate matter from car exhaust with a minimum of expense and materials. In this activity students will coat a piece of white paper with vaseline and check the emissions from cars operated by teachers from our middle school.

II. Questions

1. To lead into the activity ask:
   a. Are automobiles considered a major source of pollution to the environment?
   b. What are some signs of auto pollution that can be seen here in our own community?
   c. Is this pollution always visible?
   d. Are cars considered a source of pollution only when they are being used and driven?

2. To initiate the activity ask:
   a. How could we check the solid wastes produced from an auto exhaust system?
   b. Could vaseline and a sheet of white paper be used?
   c. Could first-aid gauze pads be used in some way?

3. To continue the activity ask students:
   a. In collecting samples what standards could be used so that each test is the same as the next?
   b. How should the checks be compared?
   c. What might be some conditions in an engine that would cause a large amount of soot and oil to be produced in the exhaust?
   d. Where could a selection of cars be obtained to be tested-?

4. Evaluation:
   a. How do the tests compare? Are there obvious differences between them?
   b. Can any correlations be made between the questionnaires and the solid waste in the exhaust?
   c. Are there some ways in which the collecting procedure might be improved?

III. Equipment

1. Vaseline and white sheets of paper.
2. Pieces of cardboard to hold the collection sheet under the exhaust pipe.
3. Rulers to measure the distance between the exhaust pipe and the collection sheet.
4. Paper for questionnaires for car owners.

IV. Procedure

1. Discuss the activity with students and let them decide on a method of collecting the solid wastes. For this activity the vaseline film on paper will serve as the collecting method.
2. Have students make up a short questionnaire that car owners could complete while their car is being checked. The questionnaire would contain questions that might have some bearing on the solid wastes produced.
3. For each test, provide students with a white sheet of paper and cover with a film of vaseline. Using a piece of cardboard to support it, place it four inches away from the end of the tailpipe for three minutes.
4. Some of the teachers would probably volunteer to have their cars checked. Possibly appointments could be set up during the free periods for the staff. Hopefully enough teachers would cooperate so that a variety of results could be obtained.
5. After the data is collected, it could be compared and placed on a bulletin board possibly from cleanest to dirtiest. Car questionnaires could be stapled to the exhaust check so that engine maintainence and exhaust quality could be compared.
6. Have students make comparisons and suggestions as to how engine exhaust might be cleaned up.

QUESTIONS TO EXPAND ARE MISSING.

A P P E N D I X

FACT SHEET ----------A-1

COURSE TOPICS AND CONTENT----------A-2

INSTRUCTIONS FOR WRITING ACTIVITIES----------A-3

"ENVIRONMENTAL LITERATURE"----------A-4

FACT SHEET

Name: Project KARE (Knowledgeable Action to Restore our Environment)

Purpose: To strengthen environmental education in the region.

Sponsors: The five Intermediate Units of Bucks, Chester, Delaware, Montgomery, and Philadelphia counties; the Roman Catholic Archdiocese of Philadelphia; and the Philadelphia Model Cities Program.

Grantee: The Montgomery County Intermediate Unit serves as Local Educational Agency; Dr. Dennis Harken, Executive Director.

Funding: United States Office of Education, HEW, under Title III, Section 306 of ESEA.

Constituency: Schools in the Southeastern Pennsylvania region offering basic education in grades K-12; including 69 public-school districts and over 300 non-public schools.

Objectives: Local schools are encouraged to:

- .Teach, experience and learn rural-urban-suburban cooperation in environmental problem-solving.
- .Utilize learning approaches which are action-oriented and inter-disciplinary.
- .Foster community participation in environmental education.

Activities: LOCAL ACTION PROGRAM (LAPs) -- are conducted by local schools with funds and technical assistance from Project KARE. Each LAP school engages in interdisciplinary activities dealing with specific environmental problems such as stream pollution and community deterioration. Over 35,000 students have participated directly in the 75 LAPs conducted since 1971. In many cases, LAP activities have been incorporated into the ongoing curricula of sponsoring schools.

ENVIRONMENTAL STUDIES CONSULTANT SERVICES (ESCS) -- are provided to requesting schools by project staff who perform site-analyses, in-service training, and curriculum design. Over 95 percent of constituent school districts are utilizing this technical assistance.

ENVIRONMENTAL EDUCATION RESOURCE CENTER (EERC) -- provides students, teachers and community with information, research findings and curriculum materials which have been annotated by project staff according to usage and quality.

Staff: Project Director, Assistant Director, two Environmental Specialists and Information Specialist.

COURSE TOPICS AND CONTENT

Day 1- Various activities were conducted to prepare the participants to investigate bodies of water ranging in size from mud puddles to the Delaware River.

Day 2- A historical chronology of American attitudes toward the environment was explored, including the recently published (November, 1973) Viladas Report. Environmental art, music, photography, poetry and literature were also included.

Day 3- Various kinds of air pollutants as well as their relationship to vegetation and human health were explored.

Day 4- The living and nonliving components of soil were investigated including soil types and profiles. Bog and/or pond sediments were studied also.

Day 5- Process skills were explained and then used by the participants as they experienced a series of activities dealing with solid wastes. The progression of the activities was as follows: awareness-transitional-operational problem-investigation.

Day 6- Production and consumption of energy were the underlying themes of this session. Economic, social and political considerations were included.

Day 7- Physical and psychological disturbances were related to excessive noise levels. Plane table mapping was introduced as a means of constructing school and community grids of noise levels.

Day 8- Non-human as well as human populations were considered. Factors affecting population sizes and densities were investigated. Methods for estimating the population size of wild animals were used.

Day 9- The economics, efficiency and environmental compatibility of various means of transportation were investigated and compared.

Day 10- In-depth exposure to selected commercially available materials and means for the integration of environmental studies into non-environmentally oriented programs were the major activities.

INSTRUCTIONS FOR WRITING ACTIVITIES

Three activity levels should be considered when designing programs for students: (1) awareness, (2) transitional and (3) operational. The activities at the first level are designed to create or to increase students' awareness of environmental quality. The transitional activities provide experiences which will allow students and teachers to take action related to particular problems or concerns. The third level provides the background for in-depth, on-going problem investigations.

One way to design activities is through the use of a question-oriented format. Open-ended questioning will prevent a mechanistic, step by step use of printed (developed) formats. Questions, therefore, are an integral part of each activity. The questions are of five types: (a) those that lead to the activity, (b) those that initiate the activity, (c) those that continue the activity, (d) those that expand the activity and (e) those that will help to evaluate the activity. By encouraging student response in this manner the authority-figure role of the teacher is diminished and students gain confidence in their ability to make decisions and to initiate their own learning programs.

Activities should be developed with process skills in mind. The purpose of a process-oriented development is to set the basis for student-initiated activities. Students will be better able to deal with investigations of their own design if they have had previous experience with process skills.

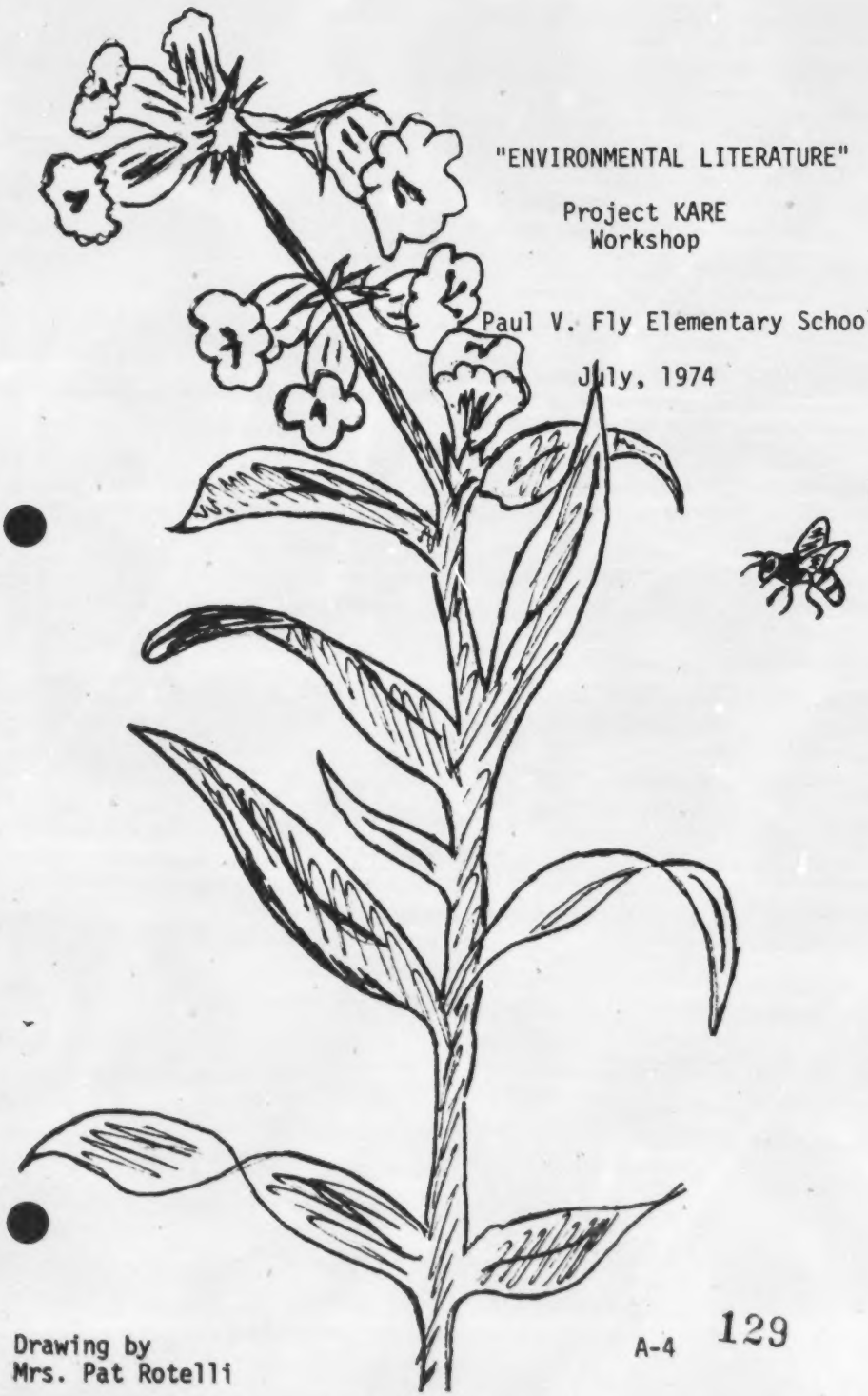
The process skills are divided into levels which parallel those of the activities. They are as follows:

1. Awareness level
   a. observing
   b. categorizing
   c. comparing
   d. measuring
   e. inferring
   f. questioning

2. Transitional level
   a. predicting
   b. data collection
   c. data processing
   d. data evaluation
   e. formulation of hypotheses

3. Operational level
   a. problem recognition and definition
   b. problem analysis
   c. data processing
   d. data evaluation
   e. data utilization

Reference: Sparks, P.M., Hershey, J.T., and Sexton, A.D., A Curriculum Activities Guide to Solid Waste and Environmental Studies, Institute for Environmental Education, Cleveland, Ohio. 1973



"ENVIRONMENTAL LITERATURE"

Project KARE
Workshop

Paul V. Fly Elementary School

July, 1974

Drawing by
Mrs. Pat Rotelli

Walking quietly,
I smell, look, touch and listen,
Enjoying nature.

Green, brown, yellow, red.
The colors of nature call,
Share in my beauty.

The ants move quickly.
There is no time to waste now,
Winter is coming.

The towering trees
Gently swaying in the wind,
Speak softly to me.

A babbling brook
Rushes gently over rocks,
What lies beneath them?

Birds chirp, flowers bloom,
Enjoy the beauty about
But do not disturb.

Rainfall on the grass
Sounds of summer to enjoy
Make flowers grow very tall.

Standing by the stream
Can I find a place to think?
Nature has a spot for me.

White snow on the ground
Each flake created unique,
Falling, gently fall.

The Canvas

Nature's canvas is pure,
Its colors engulfs the soul
The soul needs the canvas

The voice of the sea
is a reminder to me,
that everything's fine.

A lightning bolt strikes,
mother nature displays her anger
don't get mom upset.

Walking in the woods,
Among the trees and bushes
Gives a calm feeling.

A lone tree grows tall,
Shading the earth beneath it
As the sun shines bright.

Beauty is created
By many kinds of flowers
Growing all around.

The frog feels slimy
But I'll touch him just to see
If he'll jump away.

Enchanting forest
Stretching branches to the sun
Dying to live now.

Beware its beauty.
Nearby plants face certain doom,
By strangulation.

For a great surprise
Handle jewel weed seeds with care,
oops-----where did they go?

Delicious, but how?
Pull nutrients from the soil,
and soak up the sun.

Everyone likes art work.
Nature art is fun to us
When its on the wall.

The sun shines on us
We grow towards the sky,
People grow very fast.

The cycle moves fast
We are here then we are gone,
We must make our mark.

Berries in the bush
Fragrances throughout the air,
All for us to share.

Spice bush got its name
Not from its smell or odor
It grows like a bush.

Squash all the berries,
Crush, stamp, smash the leaves, the grass
Destroy to create.

Honeysuckle grows
Roadside to field to forest,
A good plan gone bad.

Mosses are so soft,
They form a magic carpet
Green is beautiful.

Mushrooms are spongy.
Some are very poisonous,
Look before you pick.

Flowers in the night
Braced against the evening dew.
Waiting for the sun.

Bees building through noon,
Enclosing spider in mud
Will lay egg and die. (con't)

(con't) Ant walks into bee,
Bee bites off ant's antennae...
A catastrophe.

Color on a page,
Is pleasing when observing
The many sources.

Of those who appreciate the mud,
There are some who sit with a thud.
For it's mud's friendly squishes,
That fulfill their deep wishes,
But alas, they can't stay in this crud.